US EPA-APPROVED

TOTAL MAXIMUM DAILY LOAD (TMDL)

FOR

UPPER RIO GRANDE WATERSHED

SEPTEMBER 13, 2012

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***COVER PHOTO**: Rio Grande above Embudo Creek. April 2009.*

LIST OF ABBREVIATIONS

4Q3	4-Day, 3-year low-flow frequency
BMP	Best management practices
CFR	Code of Federal Regulations
cfs	Cubic feet per second
cfu	Colony forming units
CGP	Construction general storm water permit
CWA	Clean Water Act
^oC	Degrees Celsius
^oF	Degrees Fahrenheit
HUC	Hydrologic unit code
$j/m^2/s$	Joules per square meter per second
km^2	Square kilometers
LA	Load allocation
lbs/day	Pounds per day
mgd	Million gallons per day
mg/L	Milligrams per Liter
mi^2	Square miles
mL	Milliliters
MOS	Margin of safety
MOU	Memorandum of Understanding
MS4	Municipal separate storm sewer system
MSGP	Multi-sector general storm water permit
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source
QAPP	Quality Assurance Project Plan
RFP	Request for proposal
SEE	Standard Error of the Estimate
SSTEMP	Stream Segment Temperature Model
SWPPP	Storm water pollution prevention plan
SWQB	Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WQCC	Water Quality Control Commission
WQS	Water quality standards (NMAC 20.6.4 as amended through April 30, 2012)
WBP	Watershed-based plan
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop Total Maximum Daily Load (TMDL) management plans for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint source and background conditions. TMDLs also include a Margin of Safety (MOS).

The Surface Water Quality Bureau (SWQB) conducted a water quality survey of the Upper Rio Grande basin of north-central New Mexico in 2009. Water quality monitoring stations were located within the Upper Rio Grande and Conejos watersheds to evaluate the impact of tributary streams and ambient water quality conditions. As a result of assessing data generated during this monitoring effort, impairment determinations of New Mexico water quality standards included *E.coli* for the nine assessment units discussed in this TMDL.

This TMDL document addresses the above noted impairments as summarized in the tables below. The SWQB has prepared separate TMDL bundles for other surface waters in these watersheds, including the 2004 Upper Rio Grande Part 1 and the 2005 Upper Rio Grande Part 2 TMDL documents. The 2009 study identified other potential water quality impairments which are not addressed in this document. Additional data needs for verification of those impairments are being identified and data collection will follow. If the impairments are verified, subsequent TMDLs will be prepared in a separate TMDL document.

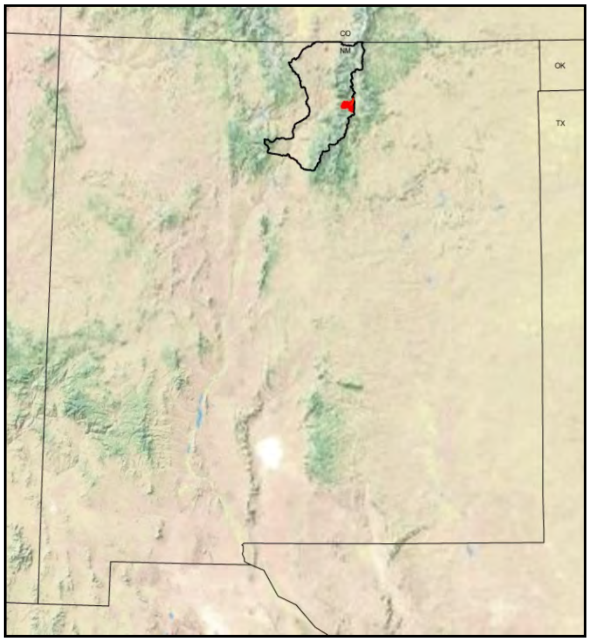
The SWQB's Monitoring and Assessment Section will collect water quality data during the next rotational cycle. The next scheduled monitoring date for the Upper Rio Grande – Conejos Watersheds is 2017, at which time TMDL targets will be re-examined and potentially revised as this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate and/or if new standards are adopted, the load capacity will be adjusted accordingly. When water quality standards have been achieved, the reach will be moved to the appropriate category in the Integrated Report.

The SWQB's Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the Watershed-Based Plans will be done with participation of all interested and affected parties.

TOTAL MAXIMUM DAILY LOAD FOR
APACHE CANYON (RIO FERNANDO DE TAOS TO HEADWATERS)

New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-98.A_002
Segment Length	1.5 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	1.35 square miles
Land Type	Southern Rockies 21f
Land Use/Cover	99% Forest; 1% Rangeland
Probable Sources	Rangeland grazing, drought-related impacts, wildlife other than waterfowl, on-site treatment systems (septic, etc), roads/bridges/culverts, logging/forestry operations, habitat modifications.
Land Management	78% US Forest Service, 22% Private
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 7.15 x10^{7} + 1.26 x10^{7} = 8.41x10^{7} cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
RIO FERNANDO DE TAOS (TIENDITAS CREEK TO HEADWATERS)



New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-98.A_001
Segment Length	3 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	12.1 square miles
Land Type	Southern Rockies 21d and 21f
Land Use/Cover	95% Forest; 5% Rangeland
Probable Sources	Cattle/livestock use, rangeland grazing, hiking trails, waste from pets, waterfowl, wildlife other than waterfowl, low water crossings, paved/gravel/dirt roads, on-site treatment systems, impervious surfaces, stormwater runoff.
Land Management	82% US Forest Service, 17% Private, 1% Native American
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 4.18×10^{8} + 7.38×10^{7} = 4.92×10^{8} cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
RIO FERNANDO DE TAOS (RIO PUEBLO DE TAOS TO USFS BND AT CANYON)

New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-2120.A_512
Segment Length	5.1 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	67.2 square miles
Land Type	AZ/NM Plateau 22f
Land Use/Cover	90% Forest; 7% Grassland; 2% Developed, 1% Shrubland
Probable Sources	Cattle/livestock grazing, stormwater runoff due to construction, on-site treatment systems, campgrounds, waste from pets, dumping garbage/litter, highway/road/bridge runoff, bridges, low water crossing, paved/gravel/dirt roads.
Land Management	82% US Forest Service, 16% Private, 3% Native American
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 1.80×10^9 + 3.18×10^8 = 2.12×10^9 cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
RIO FERNANDO DE TAOS (USFS BND AT CANYON TO TIENDITAS CREEK)

New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-2120.A_513
Segment Length	10.8 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	60.3 square miles
Land Type	Southern Rockies 21f
Land Use/Cover	96% Forest; 4% Grassland
Probable Sources	Livestock grazing, on-site treatment systems (septic, etc), ORV use, roads/bridges/culverts, habitat modifications, logging/forestry operations, recreational use, mining operations, wildlife other than waterfowl, impervious surfaces, campgrounds, stormwater runoff.
Land Management	88% US Forest Service, 12% Private, <1% Native American
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 2.09 x10^9 + 3.69 x10^8 = 2.46 x10^9 cfu/day**

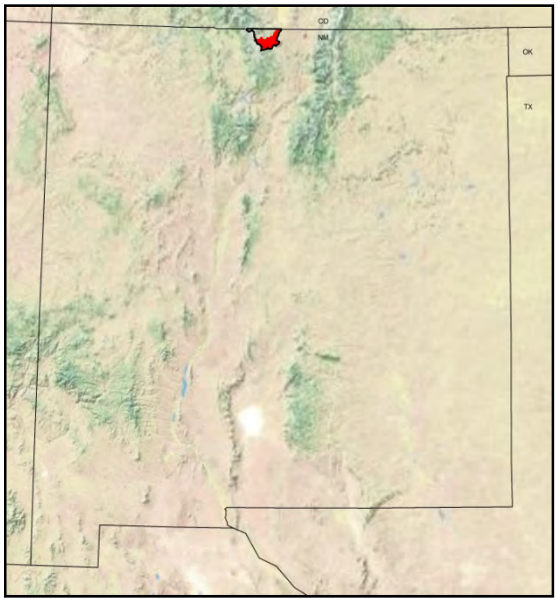
TOTAL MAXIMUM DAILY LOAD FOR
RIO PUEBLO DE TAOS (RIO GRANDE DEL RANCHO TO TAOS PUEBLO BND)

New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-2120.A_511
Segment Length	2.79 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	214 square miles
Land Type	Southern Rockies 22f
Land Use/Cover	78% Forest; 9% Agriculture, 7% Rangeland, 5% Water, 1% Barren/tundra
Probable Sources	Cattle/livestock use, rangeland grazing, residences/buildings, dumping garbage/litter, waste from pets, waterfowl, wildlife other than waterfowl, angling pressure, impervious surfaces, bridges, paved roads, on-site treatment systems, stormwater runoff, recreational use.
Land Management	56% Tribal, 30% US Forest Service, 14% Private
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 7.00 x10^9 + 1.23 x10^9 = 8.23 x10^9 cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR RIO QUEMADO (SANTA CRUZ RIVER TO RIO ARRIBA COUNTY BND)

New Mexico Standards Segment	20.6.4.121
Waterbody Identifier	NM-2118.A_52
Segment Length	3.8 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	42 square miles
Land Type	Southern Rockies 22h
Land Use/Cover	79% Forest; 14% Grassland, 5% Shrubland; 1% Barren, 1% Pasture
Probable Sources	Cattle/livestock, rangeland grazing, on-site treatment systems, inappropriate waste disposal, impervious surfaces, dumping garbage/litter, hiking trails, waste from pets, waterfowl, wildlife other than waterfowl, highway/road/bridge runoff, bridges, low water crossings, paved/gravel/dirt roads.
Land Management	62% US Forest Service, 34% Private, 4% BLM, <1% State
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 2.03 x10^{9} + 3.59 x10^{8} = 2.39 x10^{9} cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
RIO SAN ANTONIO (MONTOYA CANYON TO HEADWATERS)



New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-2120.A_901
Segment Length	12.9 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Conejos USGS Hydrologic Unit Code 13010005
Scope/size of Watershed	125 square miles
Land Type	AZ/NM Plateau 21d, 21f, 21g
Land Use/Cover	63% Rangeland; 37% Forest; 1% Agriculture
Probable Sources	Cattle/livestock use, angling pressure, waterfowl, wildlife other than waterfowl, highway/road/bridge runoff, bridges, gravel/dirt roads, mass wasting.
Land Management	US Forest Service (86%), BLM (12%), State Land (1%), Private (1%)
IR Category	5/5C
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 6.43 x10^{9} + 1.13 x10^{9} = 7.56 x10^{9} cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
RIO SANTA BARBARA (NON-PUEBLO EMBUDO CREEK TO USFS BND)

New Mexico Standards Segment	20.6.4.123
Waterbody Identifier	NM-2120.A_419
Segment Length	4.22 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	43.6 square miles
Land Type	AZ/NM Plateau 21f
Land Use/Cover	79% Forest; 14% Grassland; 2% Shrubland, 3% Pasture; 2% Barren
Probable Sources	Cattle/livestock use, rangeland grazing, on-site treatment systems, impervious surfaces, residences/buildings, urban runoff/storm sewers, dumping garbage/litter, waste from pets, bridges, paved/gravel/dirt roads.
Land Management	93% US Forest Service, 7% Private, <1% Native American
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 3.29 x10^{10} + 5.81 x10^{9} = 3.87 x10^{10} cfu/day**

TOTAL MAXIMUM DAILY LOAD FOR
SANTA CRUZ RIVER (SANTA CLARA PUEBLO BND TO SANTA CRUZ DAM)

New Mexico Standards Segment	20.6.4.114
Waterbody Identifier	NM-2111_50
Segment Length	8.1 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary Contact
Geographic Location	Upper Rio Grande USGS Hydrologic Unit Code 13020101
Scope/size of Watershed	180 square miles
Land Type	Southern Rockies 22h
Land Use/Cover	64% Forest; 33% Rangeland; 2% developed and barren; 1% crops.
Probable Sources	Cattle/livestock use, dirt roads, highway/road/bridge runoff, mass wasting.
Land Management	60% US Forest Service, 20% BLM, 20% Private, <1% State and Native American
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** **0 + 3.95×10^9 + 6.98×10^8 = 4.65×10^9 cfu/day**

1.0 INTRODUCTION

Under Section 303 of the federal Clean Water Act (CWA), states establish water quality standards, which are submitted and subject to the approval of the U.S. Environmental Protection Agency (USEPA). Under Section 303(d)(1) of the CWA, states are required to develop a list of waters within a state that are impaired and establish a total maximum daily load (TMDL) for each impairment. A TMDL is defined as "*a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standard including consideration of existing pollutant loads and reasonably foreseeable increases in pollutant loads*" (USEPA 1999). A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations (CFR) Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background conditions." TMDLs also include a margin of safety (MOS). This document provides TMDLs for assessment units within the Upper Rio Grande watershed that have been determined to be impaired based on a comparison of measured concentrations and conditions with numeric water quality criteria or with numeric translators for narrative standards.

This document is divided into several sections. Section 2.0 provides background information on the location and history of the Upper Rio Grande and Conejos watersheds, provides applicable water quality standards for the assessment units addressed in this document, and briefly discusses the water quality survey that was conducted in these watersheds in 2009. Section 3.0 presents the TMDLs developed for *E. coli.* Pursuant to CWA Section 106(e)(1), Section 4.0 provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. Section 5.0 discusses implementation of TMDLs (phase two) and the relationship between TMDLs and Watershed-Based Plans (WBPs). Section 6.0 discusses assurance, Section 7.0 public participation in the TMDL process, and Section 8.0 provides references.

2.0 UPPER RIO GRANDE WATERSHED CHARACTERISTICS

The Upper Rio Grande and Conejos watersheds were intensively sampled by the Monitoring and Assessment Section (MAS) of the Surface Water Quality Bureau (SWQB) from March to October 2009. The Upper Rio Grande watershed includes perennial reaches of the Rio Grande from Cochiti Reservoir to the Colorado/New Mexico border, as well as tributaries that enter the Rio Grande along those perennial reaches. The Conejos watershed includes perennial reaches of the Rio de Los Pinos and the Rio San Antonio in New Mexico as well as their respective headwaters. Surface water quality monitoring stations were selected to characterize water quality of the stream reaches.

2.1 Location Description

The Upper Rio Grande and Conejos watersheds (US Geological Survey [USGS] Hydrologic Unit Codes [HUCs] 13020101 and 13010005) are two adjacent watersheds located within the larger Upper Rio Grande basin in north central New Mexico. The watersheds are contained in Omernick Level III Ecoregions 21 (Southern Rockies) and 22 (Arizona/New Mexico Plateau). The watersheds encompass approximately 7,500 square miles (mi^2) and extend over portions of seven counties including Rio Arriba, Taos, Santa Fe, Los Alamos, Sandoval, Mora, and San Miguel. The impaired assessment units are contained within 7 subwatersheds: Rio Santa Barbara, Rio Fernando de Taos, Rio Pueblo de Taos, Apache Canyon, Rio San Antonio, Santa Cruz River, and Rio Quemado.

Land use in the Upper Rio Grande basin includes grazing, mining, and forest products (Figure 2.1; Table 2.1). Additionally, the area is heavily utilized by the public for fishing, hunting, camping, off-road vehicles, river rafting, and skiing. Land ownership within the study area is 46% private, 18% Bureau of Land Management (BLM), 12% U.S. Forest Service (USFS), 12% State, and 11% Native lands (Figure 2.2).

According to Natural Heritage New Mexico (a division of the Museum of Southwestern Biology at the University of New Mexico), two species within these watersheds are listed as endangered by both State and Federal agencies: the Rio Grande Silvery Minnow (*Hybognathus amarus*) and the Southwestern willow flycatcher (*Empidonax traillii extimus).* The following fish species are known to have previously existed in the Upper Rio Grande basin (upstream of Cochiti Reservoir): shovelnose sturgeon (*Scaphirhynchus platorynchus),* longnose gar (*Lepisosteus osseus),* American eel (*Anguilla rostrata),* speckled chub (*Macrhybopsis aestivalis),* and Rio Grande shiner (*Notropis jemezanus)* (Calamusso *et al*., 2005) and (Sublette *et al*., 1990).

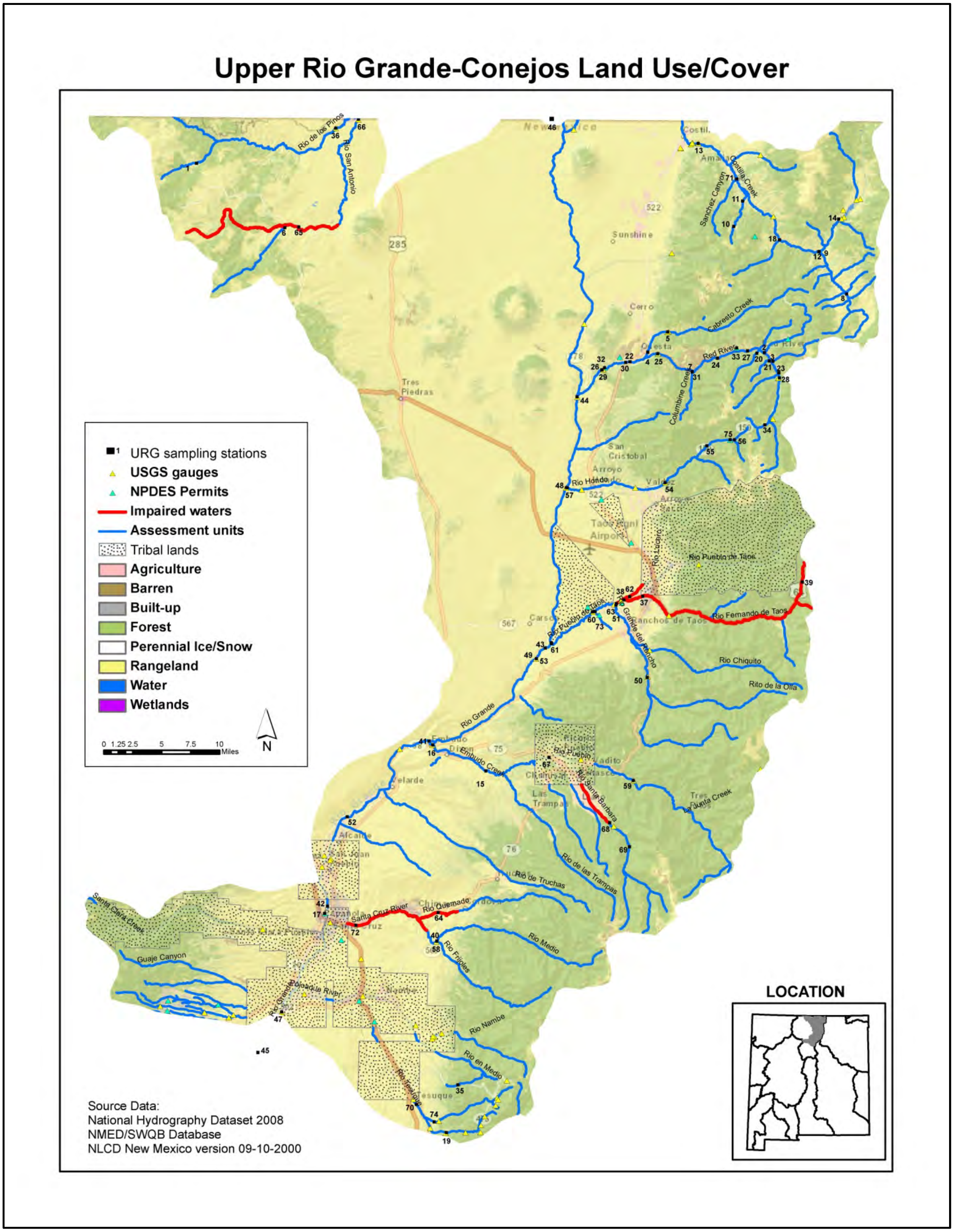


Figure 2.1 **Land use and sampling stations in the Upper Rio Grande Watershed.** See Table 2.1 for station information.

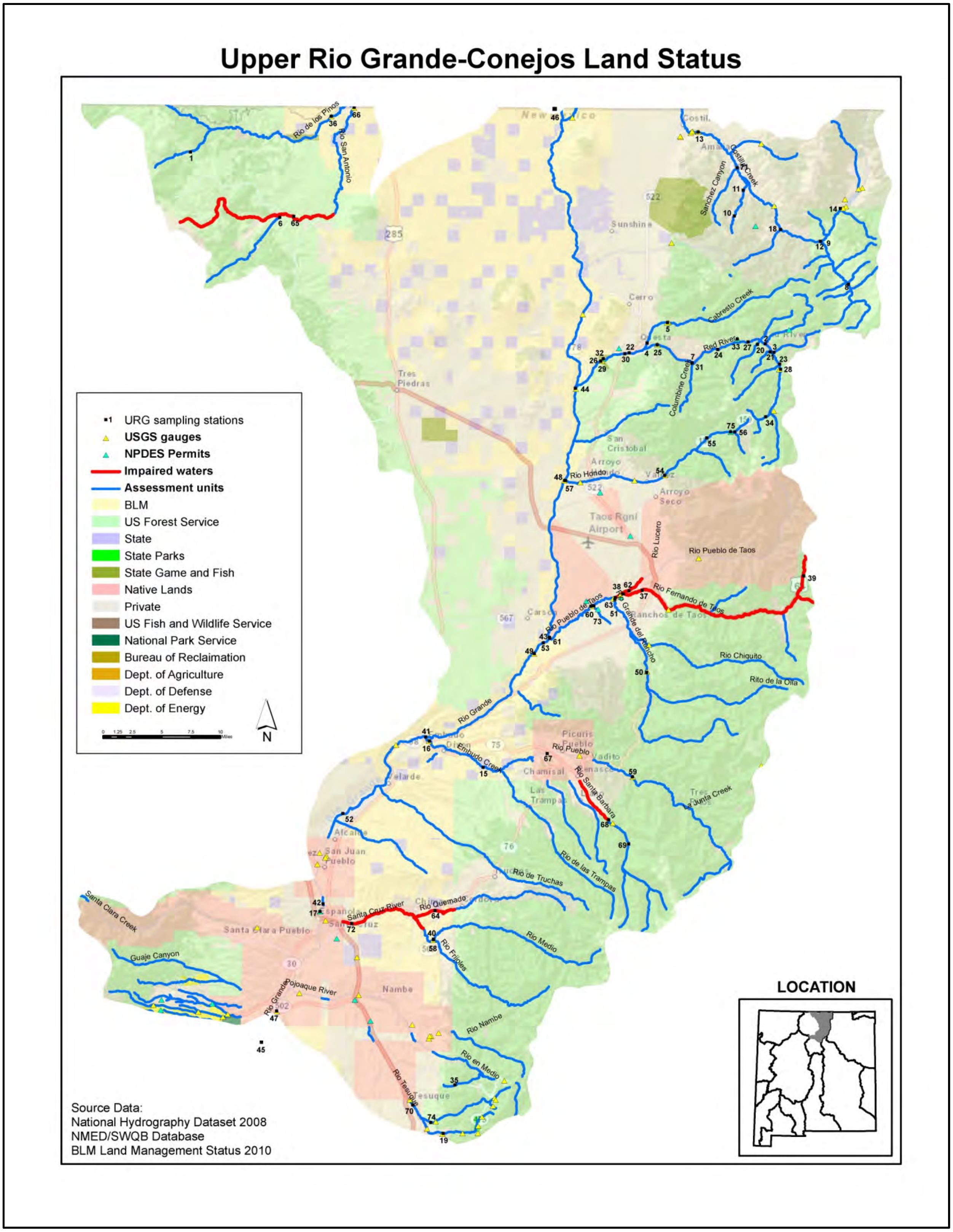


Figure 2.2 Land management and sampling stations in the Upper Rio Grande Watershed

2.2 Geology and Land Use

The geology of the Upper Rio Grande basin consists of a complex distribution of Precambrian metamorphic rocks, Paleozoic sedimentary rocks and Tertiary volcanics (Figure 2.3). The Rio Grande bisects two distinct geologic areas. The area west of the Rio Grande mainly consists of late Quaternary to Tertiary basalts formed as a result of tectonic events associated with the Rio Grande Rift. The Tertiary basalt flows are interbedded with sands and gravels, which were deposited during periods of erosion between volcanic events. The Rio Grande has incised a deep north-south canyon through these basalt flows from the Colorado border to Velarde, NM. Immediately east of the Rio Grande recent alluvial deposits cover these basalt deposits. The source of this alluvial material is the Sangre de Cristo Mountains which parallel the river. The Sangre de Cristo Mountains mainly consist of Precambrian metamorphic rocks (amphibolites, granitic gneiss, and mica schist) and granitic stocks. Dikes of rhyolite, monzonite porphyry, latite and andesite are also present. Not as common, but still notable, are the scattered deposits of Pennsylvanian sediments including conglomerates, sandstones, shales and limestones. This portion of the Sangre de Cristo range is highly mineralized and heavily mined as a result.

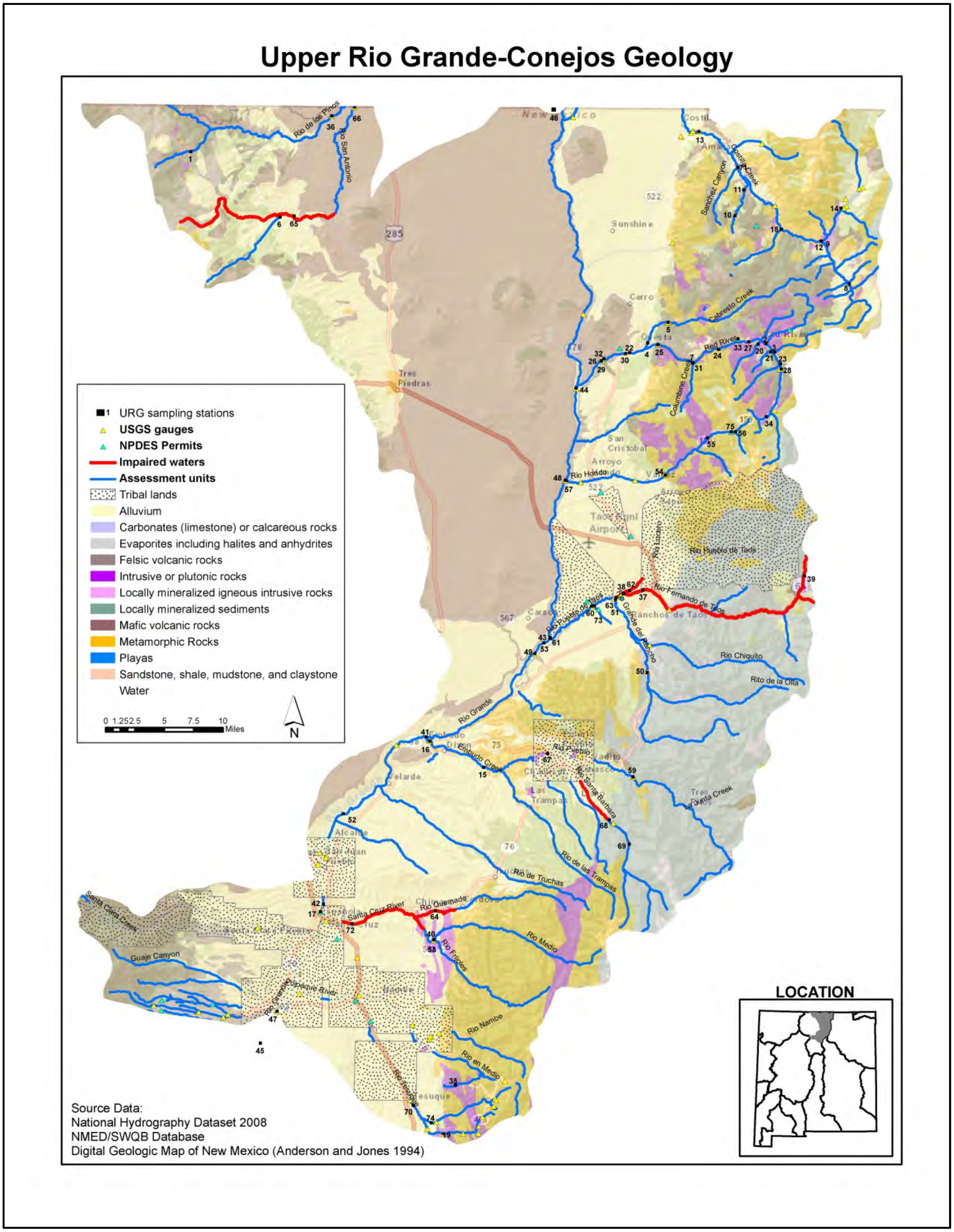


Figure 2.3 Geologic map of the Upper Rio Grande Watershed and sampling stations

2.3 Water Quality Standards and Designated Uses

Water quality standards (WQS) for all assessment units in this document are set forth in sections 20.6.4.114, 20.6.4.121, and 20.6.4.123 of the *Standards for Interstate and Intrastate Surface Waters*, 20.6.4 New Mexico Administrative Code, as amended through April 18, 2011 (NMAC 2012). These standards have been approved by the WQCC and the EPA for Clean Water Act purposes.

20.6.4.114 RIO GRANDE BASIN - The main stem of the Rio Grande from the Cochiti pueblo boundary upstream to Rio Pueblo de Taos excluding waters on San Ildefonso, Santa Clara and Ohkay Owingeh pueblos, Embudo creek from its mouth on the Rio Grande upstream to the Picuris Pueblo boundary, the Santa Cruz river from the Santa Clara pueblo boundary upstream to the Santa Cruz dam, the Rio Tesuque except waters on the Tesuque and Pojoaque pueblos, and the Pojoaque river from the San Ildefonso pueblo boundary upstream to the Pojoaque pueblo boundary. Some Rio Grande waters in this segment are under the joint jurisdiction of the state and San Ildefonso pueblo.
A. Designated Uses: irrigation, livestock watering, wildlife habitat, marginal coldwater aquatic life, primary contact and warmwater aquatic life; and public water supply on the main stem Rio Grande.
B. Criteria: **(1)** The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses.

20.6.4.121 RIO GRANDE BASIN - Perennial tributaries to the Rio Grande in Bandelier national monument and their headwaters in Sandoval county and all perennial reaches of tributaries to the Rio Grande in Santa Fe county unless included in other segments and excluding waters on tribal lands.
A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact; and public water supply on Little Tesuque creek, the Rio en Medio, the Santa Fe river and Cerrillos reservoir.
B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

20.6.4.123 RIO GRANDE BASIN - Perennial reaches of the Red river upstream of the mouth of Placer creek, all perennial reaches of tributaries to the Red river, and all other perennial reaches of tributaries to the Rio Grande in Taos and Rio Arriba counties unless included in other segments and excluding waters on Santa Clara, Ohkay Owingeh, Picuris and Taos pueblos.
A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact; and public water supply on the Rio Pueblo and Rio Fernando de Taos.
B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 400 µS/cm or less (500 µS/cm or less for the Rio Fernando de Taos); the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

The numeric criteria identified in these sections are used for assessing waters for use attainability. Section 20.6.4.900 NMAC provides a list of water chemistry analytes for which SWQB tests and identifies numeric criteria for specific designated uses. In addition, waters are assessed against the narrative criteria identified in Section 20.6.4.13 NMAC, including bottom sediments and suspended or settleable solids, plant nutrients, and turbidity. The individual water quality criteria or narrative standards are detailed for each parameter in the chapters that follow.

Current impairment listings for the Upper Rio Grande basin and subwatersheds are included in the 2012-2014 State of New Mexico Clean Water Act §303(d)/§305(b) Integrated List (NMED/SWQB 2012a). The Integrated List is a catalog of assessment units (AUs) throughout the state with a summary of their current status as assessed/not assessed or impaired/not impaired. Once a stream AU is identified as impaired, a TMDL document is developed for that segment with guidelines for stream restoration. Target values for TMDLs are determined based on 1) applicable numeric criteria or appropriate numeric translator to a narrative standard, 2) the degree of experience in applying various management practices to reduce a specific pollutant's loading, and 3) the ability to easily monitor and produce quantifiable and reproducible results. AU names and WQS have changed over the years and the history of these individual changes is tracked in the Record of Decision document associated with the 2012-2014 Integrated List available on the SWQB website.

New Mexico's antidegradation policy is articulated in Subsection A of 20.6.4.8 NMAC. It mandates that "the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state." TMDLs are consistent with this policy because implementation of a TMDL restores water quality so that existing uses are protected and water quality criteria achieved.

2.4 Water Quality Sampling

The Upper Rio Grande and Conejos watersheds were sampled by the SWQB in 2009. A brief summary of the survey and the hydrologic conditions during the sample period is provided in the following subsections. A more detailed description can be found in Upper Rio Grande Water Quality Survey Summary (NMED/SWQB 2012b).

2.4.1 Survey Design

The Monitoring and Assessment Section (MAS) of the SWQB conducted a water quality survey of the Upper Rio Grande basin between March and November, 2009. The water quality survey in the headwaters and along the mainstem included 75 sampling sites (Figure 2.1 and Table 2.1). Most sites were sampled 8 times, whereas some secondary sites were sampled one to four times. Monitoring these sites enabled an assessment of the cumulative influence of the physical habitat, water sources, and land management activities upstream from the sites. Data results from grab sampling are housed in the SWQB water quality database and were uploaded to USEPA's Storage and Retrieval (STORET)/Water Quality Exchange (WQX) database.

All temperature and chemical/physical sampling and assessment techniques are detailed in the *Quality Assurance Project Plan* (NMED/SWQB 2011a) and the SWQB assessment protocols (NMED/SWQB 2011). As a result of the 2009 monitoring effort and subsequent assessment of results, several surface water impairments were determined. Accordingly, these impairments were added to New Mexico's Integrated CWA §303(d)/305(b) List in 2012 (NMED/SWQB 2010b).

Additionally, data was submitted by Amigos Bravos, Water Sentinels, and the USFS for sites on the Apache Canyon, Rio Fernando de Taos, and Rio Pueblo de Taos. Those data were used in the assessments includd on the New Mexico's Integrated CWA §303(d)/305(b) List in 2012 (NMED/SWQB 2010b) and are noted in Table 2.1

Table 2.1 SWQB 2009 Upper Rio Grande sampling stations

Map ID #	Station Name	Station ID
1	Beaver Creek	27Beaver004.6
2	Bitter Creek	28Bitter000.1
3	Bobcat Creek	28Bobcat000.3
4	Cabresto Creek @ NM 38	28Cabres000.9
5	Cabresto Creek @ USGS gage	28Cabres005.4
6	Cañada Tío Grande abv Río San Antonio	27CTGran000.7
7	Columbine Creek at Columbine Camp Ground	28Columb000.2
8	Comanche below upper exclosure	28Comanc007.7
9	Comanche Creek above Costilla Creek	28Comanc000.1
10	Cordova Creek 300m upstream from Day Lodge	28Cordov006.2
11	Cordova Creek above Costilla Creek	28Cordov001.5
12	Costilla Cr abv Comanche Cr	28RCosti032.5
13	Costilla Creek above Costilla at Hwy 196 bridge	28RCosti005.7
14	Costilla Creek at USFS Vermejo Park boundary	28RCosti038.5
15	Embudo Creek above Cañoncito	28Embudo010.1
16	Embudo Creek at Hwy 68 bridge	28Embudo000.8
17	Española WWTP effluent	NM0029351
18	Latir Creek at Costilla Creek	28LatirC000.1
19	Little Tesuque Creek at FS boundry	28LTesuq004.5
20	Pioneer Creek about 400 yards abv Red River	28Pionee000.7
21	Placer Creek, about 400 yds above Red River	28Placer000.2
22	Red River @ bridge abv Questa WWTF	28RedRiv009.8
23	Red River @ Goose Creek	28RedRiv034.8
24	Red River @ Molycorp boundary	28RedRiv024.4
25	Red River @ USGS gage	28RedRiv014.0
26	Red River above Fish Hatchery and diversion	28RedRiv005.9
27	Red River at Junebug abv Red River WWTP	28RedRiv028.5
28	Red River at Zwergle	28RedRiv035.5
29	Red River below Fish Hatchery near USGS	28RedRiv005.3
30	Red River blw Questa WWTF	28RedRiv009.2
31	Red River downstream of Moly abe Columbine	28RedRiv019.6
32	Red River fish hatchery effluent	28RRHatchery
33	Red River WWTP effluent	NM0024899
34	Red River, Middle Fork	28MFkRed001.0
35	Rio Chupadero above summer homes	28RChupa015.2
36	Rio de los Pinos at USGS gage	27RPinos002.6
37	Rio Fernando de Taos @ Fred Baca Park	28RFerna003.2
38	Rio Fernando de Taos abv Rio Pueblo de Taos	28RFerna000.3
39	Rio Fernando de Taos at Hwy 64 bridge	28RFerna031.7
40	Rio Frijoles above Rio Medio	28RFrijo000.1
41	Rio Grande above Embudo Creek	28RGrand628.0
42	Rio Grande above Española at Valdez Bridge	28RGrand565.5

Map ID #	Station Name	Station ID
43	Rio Grande above the Rio Pueblo de Taos	28RGrand651.2
44	Rio Grande abv Red River	28RGrand678.5
45	Rio Grande at Buckman Road	30RGrand541.7
46	Rio Grande at NM CO border at USGS in CO	28RGrand734.5
47	Rio Grande at Otowi Bridge	28RGrand547.2
48	Rio Grande below Rio Hondo USGS	28RGrand665.0
49	Rio Grande blw Taos Junc Bridge USGS gage	28RGrand647.9
50	Rio Grande del Rancho @ gage near Talpa	28RGRanc013.1
51	Rio Grande del Rancho abv Rio Pueblo de Taos	28RGRanc000.2
52	Rio Grande near Los Luceros	28RGrand579.7
53	Rio Grande Spring	28RGrandeSpr
54	Rio Hondo 1.5 miles above Valdez at USGS	28RHondo014.8
55	Rio Hondo 2.4 miles blw WWTP	28RHondo022.4
56	Rio Hondo 50 feet above WWTP	28RHondo027.3
57	Rio Hondo at Rio Grande confluence	28RHondo000.1
58	Rio Medio above Santa Cruz River	28RMedio000.1
59	Rio Pueblo .8 miles above Hwy 518/75 at USGS	28Pueblo013.4
60	Rio Pueblo de Taos 20m below Taos WWTP	28RPuebT008.1
61	Rio Pueblo de Taos 400m above Rio Grande	28RPuebT000.1
62	Rio Pueblo de Taos above Rio Fernando	28RPuebT015.8
63	Rio Pueblo de Taos near Los Cordovas	28RPuebT013.2
64	Rio Quemado near Chimayo	28RQuema003.1
65	Rio San Antonio at FR 87 bridge	27RSanAn025.3
66	Rio San Antonio at NM CO border in Ortiz	27RSanAn000.4
67	Rio Santa Barbara abv Embudo Creek	28RSanBa000.2
68	Rio Santa Barbara at Hodges Campground	28RSanBa013.2
69	Rio Santa Barbara @ Santa Barbara Campground	28RSanBa017.9
70	Rio Tesuque @ Tesuque Village Road	28RTesuq018.5
71	Sanchez Creek above Costilla Creek	28Sanche000.1
72	Santa Cruz River at town of Quarteles	28SanCru004.2
73	Unnamed Arroyo above Rio Pueblo de Taos	28Unnamed000.1
74	Tesuque Creek at gage near Santa Fe	28Tesuqu023.4
75	Twining WWTP effluent	NM0022101

2.4.2 Hydrologic Conditions

There are four active USGS gaging stations in the streams discussed in this document: Rio Pueblo de Taos below Los Cordovas, Rio Pueblo de Taos near Taos, San Antonio River at Ortiz, CO, and Santa Cruz River near Cundiyo. The annual mean streamflows for the Rio Pueblo de Taos gage below Los Cordovas over the period of record is 73.0 cubic feet per second (cfs) and 25 cfs at the Rio San Antonio gage at Ortiz, CO (Figures 2.4 and 2.5). During the 2009 watershed survey, daily flows in the watershed were below average or about average most of the year.

As stated in the Assessment Protocol (NMED/SWQB 2011), data collected during all flow conditions, including low flow conditions (i.e., flows below 4-day, 3-year flows [4Q3]), will be used to determine designated use attainment status during the assessment process. For the purpose of assessing designated use attainment in ambient surface waters, WQS apply at all times under all flow conditions.

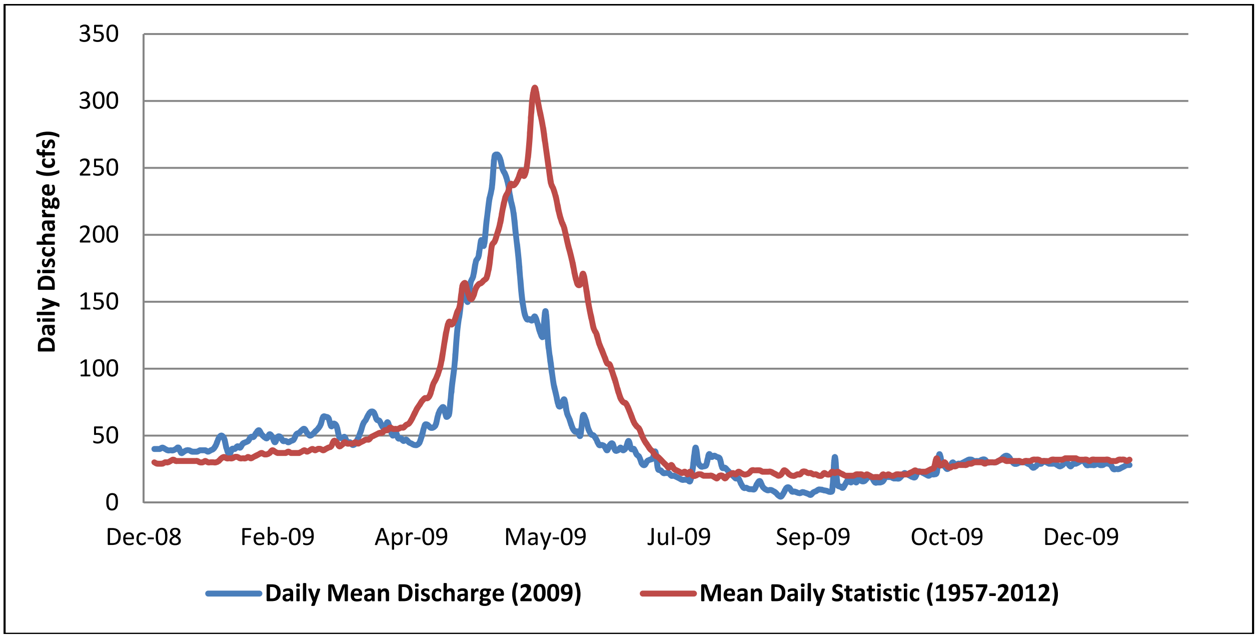


Figure 2.4 USGS 08276300 Rio Pueblo de Taos below Los Cordovas, NM

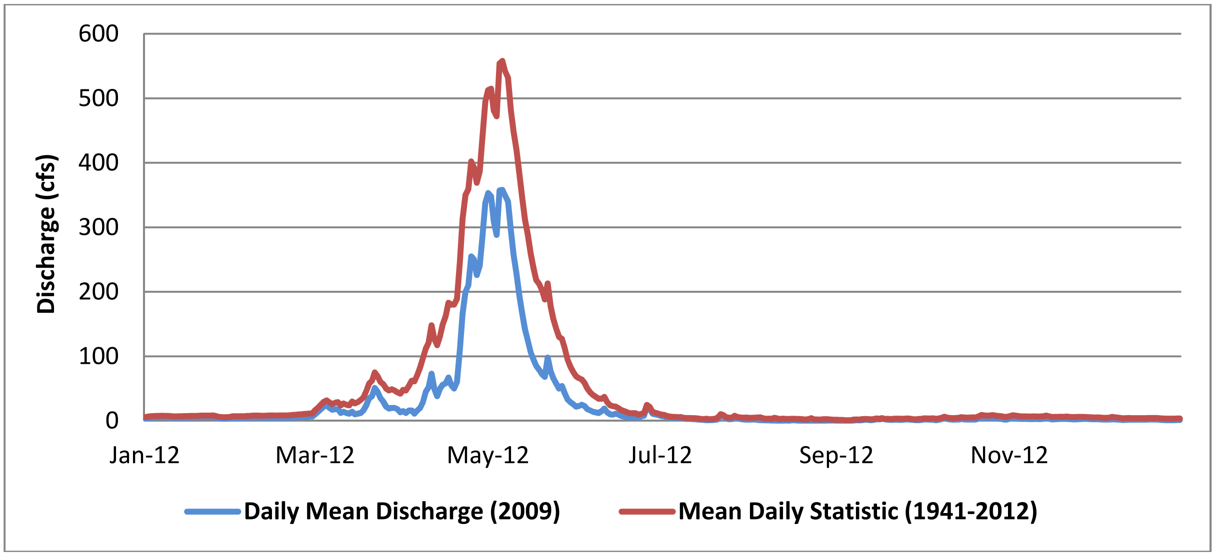


Figure 2.5 USGS 08247500 San Antonio River at Ortiz, CO

3.0 BACTERIA

Assessment of the data from the 2009 SWQB water quality survey in the Upper Rio Grande basin identified exceedences of the New Mexico water quality standards for *E. coli* bacteria in a number of watersheds; nine of which are addressed in this TMDL document.

As a result, these assessment units were listed on the Integrated CWA §303(d)/§305(b) List with *E. coli* as a pollutant of concern (NMED/SWQB 2012a). When water quality standards have been achieved, the reach will be moved to the appropriate category on the Clean Water Act Integrated §303(d)/§305(b) List of assessed waters.

3.1 Target Loading Capacity

For this TMDL document, target values for bacteria are based on the reduction in bacteria necessary to achieve the numeric criterion associated with the primary contact use for this waterbody:

> *20.6.4.114 NMAC – The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable; (20.6.4.900 NMAC Subsection D) Primary Contact: The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 410 cfu/100 mL or less.*

> *20.6.4.121 NMAC – The following segment-specific criterion applies; Primary Contact: The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 235 cfu/100 mL or less.*

> *20.6.4.123 NMAC – The following segment-specific criterion applies; Primary Contact: The monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less; single sample 235 cfu/100 mL or less.*

The presence of *E. coli* bacteria is an indicator of the possible presence of other pathogens that may limit beneficial uses and present human health concerns. Exceedences are presented in Table 3.1.

Table 3.1 *E. coli* exceedences

Assessment Unit	Designated Use Affected	Associated Criterion* (cfu/100mL)	Exceedence Ratio (# exceedences / total # samples)
Apache Canyon (Rio Fernando de Taos to headwaters)	PC	235	4/18
Rio Fernando de Taos (Tienditas Creek to headwaters)	PC	235	20/45

Assessment Unit	Designated Use Affected	Associated Criterion* (cfu/100mL)	Exceedence Ratio (# exceedences / total # samples)
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	PC	235	11/29
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	PC	235	8/46
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd)	PC	235	9/45
Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	PC	235	2/4
Rio San Antonio (Montoya Canyon to headwaters)	PC	235	3/4
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	PC	235	3/7
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	PC	410	2/5

Notes: The geometric mean criterion for all assessment units is 126 cfu/100mL as displayed in Table 3.3.

* = single sample criterion
PC = Primary Contact
cfu = colony forming units
mL = milliliters

3.2 Flow

TMDLs are calculated at a specific flow and bacteria concentrations can vary as a function of flow. SWQB determined streamflow during the 2009 sampling season either by using the active USGS gage network or by taking direct in-stream flow measurements utilizing standard procedures. Water quality standard exceedences for these waters occurred during lower flows. Therefore, for these reaches, the critical flow value used to calculate the TMDLs was obtained using a 4-day, 3-year low-flow frequency (4Q3) regression model. The 4Q3 is the annual lowest 4 consecutive day flow that occurs with a frequency of at least once every 3 years.

When available, USGS gages are used to estimate flow using DFLOW software (USEPA 2006a); however, it is often necessary to estimate a critical flow for a portion of a watershed where there is no active USGS flow gage. 4Q3 derivations for ungaged streams in the Upper Rio Grande basin were based on analysis methods described by Waltemeyer (2002). In Waltemeyer’s analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e., statewide and mountainous regions above 7,500 feet in elevation). The following statewide regression equation is based on data from 50 gaging stations with non-zero discharge (Waltemeyer 2002):

$$4Q3 \quad = \quad 1.2856\times10^{-4}\ DA^{0.42}\ P_w^{\ 3.16} \qquad \text{(Eq. 3-1)}$$

where,

4Q3 = Four-day, three-year low-flow frequency (cfs)

DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)

The average standard error of estimate (SEE) and coefficient of determination are 126 and 48 percent, respectively, for this regression equation (Waltemeyer 2002). The following regression equation for mountainous regions above 7,500 feet in elevation is based on data from 40 gaging stations with non-zero discharge (Waltemeyer 2002):

$$4Q3 = 7.3287 \times 10^{-5}\ DA^{0.70}\ P_w^{\ 3.58}\ S^{1.35} \qquad \text{(Eq. 3-2)}$$

where,

4Q3 = Four-day, three-year low-flow frequency (cfs)
DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)
S = Average basin slope (percent)

The average SEE and coefficient of determination are 94 and 66 percent, respectively, for this regression equation (Waltemeyer 2002). The 4Q3s for Apache Canyon, Rio Fernando de Taos, Rio Quemado, Rio San Antonio, Rio Santa Barbara, and Santa Cruz River were estimated using the mountainous regression equation (Eq. 3-2) because the mean elevations for these assessment units are greater than 7,500 feet above sea level (Table 3.2).

Table 3.2 Calculation of 4Q3 low-flow frequencies

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean Winter Precipitation (in.)	Average Basin Slope	4Q3 (cfs)
Apache Canyon (Rio Fernando de Taos to headwaters)	9275	1.35	8.63	0.226	0.03
Rio Fernando de Taos (Tienditas Creek to headwaters)	9157	12.1	9.16	0.229	0.16
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	8970	67.2	9.30	0.267	0.69
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	9068	60.3	9.69	0.283	0.80
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd) [1]	8930	201	10.9	0.271	2.67
Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	8651	42.0	10.14	0.296	0.77
Rio San Antonio (Montoya Canyon to headwaters) [2]	8775	67.3	17.1	0.136	2.45
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	10,850	43.6	20.65	0.346	12.5
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam) [3]	8291	179	9.27	0.290	1.51

[1] *Although the Rio Pueblo de Taos is a gaged stream, a drainage area ratio adjustment that extrapolates flow from the gaged site to the ungaged site, such as the method developed by Thomas et al. (1997), could not be applied because the drainage area ratio between the gaged and ungaged sites did not meet the requirements for proper application of this method.*

[2] *The active USGS gage (08247500) records zero flow for May-August in most years. This gage was not used. See Appendix E of Upper Rio Grande Part 1 TMDLs.*

[3] *While an active USGS gage exists (08291000), Santa Cruz Lake exists between the AU and the gage. Using the flow from this gage is not reasonable for the TMDL.*

The critical streamflow values were converted from cubic feet per second (cfs) to units of million gallons per day (mgd) as follows:

$$0.03\,\frac{ft^3}{\sec}\times 1{,}728\,\frac{in^3}{ft^3}\times 0.004329\,\frac{gal}{in^3}\times 86{,}400\,\frac{\sec}{day}\times 10^{-6} = 0.02\,mgd \qquad \text{(Eq. 3-3)}$$

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of a planning process designed to achieve water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

3.3 Calculations

Bacteria standards are expressed as colony forming units (cfu) per unit volume. The *E. coli* criterion used to calculate the allowable stream loads for the impaired assessment units is listed in Table 3.3. Total maximum daily loads (TMDLs), or target loading capacities, for bacteria are calculated based on flow values, water quality standards, and a conversion factor (Equation 3-4). The more conservative monthly geometric mean criterion is utilized in TMDL calculations to provide an implicit MOS. Furthermore, if the single sample criterion was used as a target, the geometric mean criterion may not be achieved.

*C as cfu/100 mL * 1,000 mL/1 L * 1 L/ 0.264 gallons * Q in 1,000,000 gallons/day = cfu/day* (Eq. 3-4)

Where C = the water quality criterion for bacteria,
Q = the critical stream flow in million gallons per day (mgd)

Table 3.3 Calculation of target loads for *E.coli*

Assessment Unit	Critical Flow (mgd)	*E.coli* geometric mean criterion (cfu/100mL)	Conversion Factor[(a)]	Target Load (cfu/day)
Apache Canyon (Rio Fernando de Taos to headwaters)	0.02	126	3.79×10^7	8.41×10^7
Rio Fernando de Taos (Tienditas Creek to headwaters)	0.10	126	3.79×10^7	4.92×10^8
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	0.44	126	3.79×10^7	2.12×10^9
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	0.52	126	3.79×10^7	2.46×10^9
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd)	1.72	126	3.79×10^7	8.23×10^9
Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	0.50	126	3.79×10^7	2.39×10^9
Rio San Antonio (Montoya Canyon to headwaters)	1.58	126	3.79×10^7	7.56×10^9
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	8.10	126	3.79×10^7	3.87×10^{10}
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	0.97	126	3.79×10^7	4.65×10^9

Notes: *(a)* Based on equation 3-4.

The measured loads for *E.coli* were similarly calculated. The arithmetic mean of the data used to determine the impairment was substituted for the criterion in Equation 3-4. The same conversion factor was used. Results are presented in Table 3.4.

The samples collected and the impairment determinations are based on exceedences of the State's single sample criterion and the TMDL is written to the address the monthly geometric mean standard. As such any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over estimation of the actual reduction necessary. Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the "percent reduction" value can be calculated in multiple ways and as a result can often misinterpreted.

Table 3.4 Calculation of measured loads for *E.coli*

Assessment Unit	Critical Flow (mgd)	*E.coli* Arithmetic Mean$^{(a)}$ (cfu/100mL)	Conversion Factor$^{(b)}$	Measured Load (cfu/day)
Apache Canyon (Rio Fernando de Taos to headwaters)	0.02	154	3.79×10^7	1.17×10^8
Rio Fernando de Taos (Tienditas Creek to headwaters)	0.10	538$^{(c)}$	3.79×10^7	2.04×10^9
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	0.44	303$^{(c)}$	3.79×10^7	5.05×10^{10}
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	0.52	109*	3.79×10^7	2.15×10^9
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd)	1.72	226$^{(c)}$	3.79×10^7	1.47×10^{10}
Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	0.50	197	3.79×10^7	3.73×10^9
Rio San Antonio (Montoya Canyon to headwaters)	1.58	273	3.79×10^7	1.63×10^{10}
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	8.10	188	3.79×10^7	5.77×10^{10}
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	0.97	779	3.79×10^7	2.86×10^{10}

Notes: *(a)* Arithmetic mean of measured values
(b) Based on equation 3-3.
(c) Measured values used in calculation included values reported as "greater than" the detection limit.
* the arithmetic mean of all values may cause the value in this column to be lower than the WQS in Table 3.3. Impairment was determined using the exceedence ratio in Table 3.1.

3.4 Waste Load Allocations and Load Allocations

3.4.1 Waste Load Allocation

There are no existing point sources with an individual NPDES permit on any of the nine waterbodies addressed in this TMDL. Therefore, no WLA is included.

There are no Municipal Separate Storm Sewer System (MS4) storm water permits in this AU. However, excess bacteria concentrations may be a component of some storm water discharges covered under general NPDES permits, so the load for these dischargers should addressed.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices (BMPs) and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids, turbidity, siltation, stream bottom deposits, etc. BMPs also include measures to reduce flow velocity during and after construction compared to pre-construction conditions to assure that waste load allocations (WLAs) or applicable water quality standards, including the antidegradation policy, are met. Compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Storm water discharges from active industrial facilities are generally covered under the current NPDES Multi-Sector General Permit (MSGP). This permit also requires preparation of an SWPPP, which includes specific requirements to limit (or eliminate) pollutant loading associated with the industrial activities in order to minimize impacts to water quality. Compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL.

It is not possible to calculate individual WLAs for facilities covered by these General Permits at this time using available tools. Loads that are in compliance with the General Permits are therefore currently included as part of the load allocation (LA).

3.4.2 Load Allocation

In order to calculate the load allocation (LA), the WLA and margin of safety (MOS) were subtracted from the target capacity TMDL following Equation 3-5:

$$WLA + LA + MOS = TMDL, \text{ or}$$

$$LA = TMDL - WLA - MOS \quad \text{(Eq. 3-5)}$$

The MOS is estimated to be 15 percent of the target load calculated in Table 3.3. Results are presented in Table 3.5. Additional details on the MOS chosen are presented in Section 3.7.

The extensive data collection and analyses necessary to determine background *E.coli* loads for the Upper Rio Grande basin were beyond the resources available for this study. It is therefore assumed that a portion of the LA is made up of natural background loads.

It is important to note that WLAs and LAs are estimates based on a specific flow condition. Under differing hydrologic conditions, the loads will change. Successful implementation of this TMDL will be determined based on achieving the *E. coli* standards.

Table 3.5 TMDL for *E.coli*

Assessment Unit	WLA (cfu/day)	LA (cfu/day)	MOS (15%)* (cfu/day)	TMDL (cfu/day)
Apache Canyon (Rio Fernando de Taos to headwaters)	0	7.15×10^{7}	1.26×10^{7}	8.41×10^{7}
Rio Fernando de Taos (Tienditas Creek to headwaters)	0	4.18×10^{8}	7.38×10^{7}	4.92×10^{8}
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	0	1.80×10^{9}	3.18×10^{8}	2.12×10^{9}
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	0	2.09×10^{9}	3.69×10^{8}	2.46×10^{9}
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd)	0	7.00×10^{9}	1.23×10^{9}	8.23×10^{9}
Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	0	2.03×10^{9}	3.59×10^{8}	2.39×10^{9}
Rio San Antonio (Montoya Canyon to headwaters)	0	6.43×10^{9}	1.13×10^{9}	7.56×10^{9}
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	0	3.29×10^{10}	5.81×10^{9}	3.87×10^{10}
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	0	3.95×10^{9}	6.98×10^{8}	4.65×10^{9}

NOTE: * The MOS was calculated as 15% of the nonpoint source Load Allocation, or MOS = 0.15 × (TMDL – WLA).

3.5 Identification and Description of Pollutant Source(s)

SWQB fieldwork includes an assessment of the probable sources of impairment (Appendix A). The approach for identifying "Probable Sources of Impairment" was recently modified by SWQB to include additional input from a variety of stakeholders including landowners, watershed groups, and local, state, tribal and federal agencies. Probable Source Sheets are filled out by SWQB staff during watershed surveys and watershed restoration activities. The draft probable source list is reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period.

Probable sources that may be contributing to the observed load are displayed in Table 3.6:

Table 3.6 Pollutant source summary for *E.coli*

Assessment Unit	Pollutant Sources	Magnitude[(a)] (cfu/day)	Probable Sources[(b)]
Apache Canyon (Rio Fernando de Taos to headwaters)	NPS	1.17×10^{8}	Rangeland grazing, drought-related impacts, wildlife other than waterfowl, on-site treatment systems (septic, etc), roads/bridges/culverts, logging/forestry operations, habitat modifications
Rio Fernando de Taos (Tienditas Creek to headwaters)	NPS	2.04×10^{9}	Cattle/livestock use, rangeland grazing, hiking trails, waste from pets, waterfowl, wildlife other than waterfowl, low water crossings, paved/gravel/dirt roads, on-site treatment systems, impervious surfaces, stormwater runoff.
Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)	NPS	5.05×10^{10}	Cattle/livestock grazing, stormwater runoff due to construction, on-site treatment systems, campgrounds, waste from pets, dumping garbage/litter, highway/road/bridge runoff, bridges, low water crossing, paved/gravel/dirt roads.
Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek)	NPS	2.15×10^{9}	Livestock grazing, on-site treatment systems (septic, etc), ORV use, roads/bridges/culverts, habitat modifications, logging/forestry operations, recreational use, mining operations, wildlife other than waterfowl, impervious surfaces, campgrounds, stormwater runoff..
Rio Pueblo de Taos (R Grande del Rancho to Taos Pueblo bnd)	NPS	1.47×10^{10}	Cattle/livestock use, rangeland grazing, residences/buildings, dumping garbage/litter, waste from pets, waterfowl, wildlife other than waterfowl, angling pressure, impervious surfaces, bridges, paved roads.

Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)	NPS	3.73×10^9	Cattle/livestock, rangeland grazing, on-site treatment systems, inappropriate waste disposal, impervious surfaces, dumping garbage/litter, hiking trails, waste from pets, waterfowl, wildlife other than waterfowl, highway/road/bridge runoff, bridges, low water crossings, paved/gravel/dirt roads.
Rio San Antonio (Montoya Canyon to headwaters)	NPS	1.63×10^{10}	Cattle/livestock use, angling pressure, waterfowl, wildlife other than waterfowl, highway/road/bridge runoff, bridges, gravel/dirt roads, mass wasting.
Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)	NPS	5.77×10^{10}	Cattle/livestock use, rangeland grazing, on-site treatment systems, impervious surfaces, residences/buildings, urban runoff/storm sewers, dumping garbage/litter, waste from pets, bridges, paved/gravel/dirt roads.
Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)	NPS	2.86×10^{10}	Cattle/livestock use, dirt roads, highway/road/bridge runoff, mass wasting.

Notes: NPS= non-point sources
(a) Measured Load (Table 3.4).
(b) From the Integrated CWA 303(d)/305(b) List (NMED/SWQB 2012a). This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

The Probable Source Identification Sheets in Appendix A provide an approach for a visual analysis of potential pollutant sources along an impaired reach. Although this procedure is qualitative, SWQB feels that it provides the best available information for the identification of probable sources of impairment in a watershed. The list of “Probable Sources” is not intended to single out any particular land owner or single land management activity and has therefore been labeled “Probable” and generally includes several sources for each impairment. Table 3.6 displays probable sources of impairment along the reach as determined by field reconnaissance and assessment. Probable sources of *E.coli* will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

3.6 Linkage of Water Quality and Pollutant Sources

In general, among the probable sources of bacteria are poorly maintained or improperly installed (or missing) septic tanks, livestock grazing of valley pastures and riparian areas, upland livestock grazing, in addition to wastes from pets, waterfowl, and other wildlife. Howell et al. (1996) found that bacteria concentrations in underlying sediment increase when cattle (*Bos taurus*) have direct access to streams, such as the waters in the Upper Rio Grande basin. Natural sources of bacteria are also present from other wildlife including birds, elk, deer, and any other warm-blooded mammals. In addition to direct input from grazing operations and wildlife, *E. coli* concentrations may be subject to elevated levels as a result of resuspension of bacteria laden sediment during storm events. Temperature can also play a role in bacteria concentrations. Howell et al. (1996) observed that bacteria growth increases as water temperature increases, which may be a contributing factor in this watershed as well.

The bacteria loading in the Upper Rio Grande basin probably originates from a combination of drought-related impacts, septic systems, and livestock and wildlife wastes. Habitat modifications such as loss of riparian habitat, road maintenance and runoff, and land development or redevelopment as well as other recreational pollution sources may also be important contributors of bacteria.

In order to determine exact sources and relative contributions, further study is needed. One method of characterizing sources of bacteria is a Bacterial, or Microbial, Source Tracking (BST) study. The extensive data collection, analyses, and funding necessary to determine bacterial sources were beyond the resources available for this study.

3.7 Margin of Safety

TMDLs should reflect a margin of safety (MOS) based on the uncertainty or variability in the data, the point and nonpoint source load estimates, and the modeling analysis. The MOS can be expressed either implicitly or explicitly. An implicit MOS is incorporated by making conservative assumptions in the TMDL analysis, such as allocating a conservative load to background sources. An explicit MOS is applied by reserving a portion of the TMDL and not allocating it to any other sources.

For these bacteria TMDLs, the MOS was developed using a combination of conservative assumptions and explicit recognition of potential errors in flow calculations. Therefore, the MOS is the sum of the two elements:

- *Conservative Assumptions*

  E.coli bacteria does not readily degrade in the environment.

  Using the monthly geometric mean criterion rather than the single sample criterion calculate target loading values.

  Using the 4Q3 critical low flow "worst case scenario" to calculate the allowable loads.

- *Explicit recognition of potential errors*

  A level of uncertainty exists in sampling nonpoint sources of pollution. Accordingly, an explicit MOS of **10 percent** of the nonpoint source Load Allocation (LA) was assigned to this TMDL.

  Techniques used for measuring flow in water have a ± 5 percent precision. Accordingly, an explicit MOS of **5 percent** of the nonpoint source LA was assigned to this TMDL.

  Therefore, based on the potential errors described above an explicit MOS of 15% of the LA was assigned to these TMDLs.

3.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Data used in the calculation of these TMDLs were collected during the spring, summer, and fall of 2009 in order to ensure coverage of any potential seasonal variation in the system. Exceedences were observed from March through October, during all seasons, which captured flow alterations related to snowmelt, the growing season, and summer monsoonal rains. Higher flows may flush more nonpoint source runoff containing bacteria, whereas the low-flow condition may offer insufficient dilution. Evaluation of the seasonal variability for potential nonpoint sources is difficult due to limited available data.

3.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2035. Projected growth rates for counties in the Upper Rio Grande basin through 2035 are as follows-

22% for Taos County
7% for Rio Arriba County
15% for Rio Santa Fe County
5% for Los Alamos County
55% for Sandoval (includes the City of Rio Rancho which is not in this watershed)
8% for Mora County
13% for San Miguel County

In the stream reaches discussed in this TMDL, bacteria loading is due to diffuse nonpoint sources. Estimates of future growth are not anticipated to lead to a significant increase in bacteria concentrations that cannot be controlled with best management practices (BMPs) in this watershed. However, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit.

4.0 MONITORING PLAN

Pursuant to CWA Section 106(e)(1), the SWQB has established appropriate monitoring methods, systems and procedures in order to compile and analyze data on the quality of the surface waters of New Mexico. In accordance with the New Mexico Water Quality Act, the SWQB has developed and implemented a water quality monitoring strategy for the surface waters of the State.

The monitoring strategy establishes the methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments.

The SWQB utilizes a rotating basin system approach to water quality monitoring. In this system, a select number of watersheds are intensively monitored each year with an established return frequency of every eight years. The next scheduled monitoring date for the Upper Rio Grande watershed is 2017 (NMED/SWQB 2010b). The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities. This document, called the QAPP, is updated annually by SWQB and certified by USEPA Region 6 (NMED/SWQB 2011). In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program. Current priorities for monitoring in the SWQB are driven by the CWA Section 303(d) list of streams requiring TMDLs.

Once assessment monitoring is completed, those reaches showing impacts and requiring a TMDL may be targeted for more intensive monitoring. The methods of data acquisition include fixed-station monitoring, water quality surveys of priority assessment units (including biological assessments), and compliance monitoring of industrial, federal, and municipal dischargers, as specified in the SWQB Assessment Protocols (NMED/SWQB 2011).

Long-term monitoring for assessments will be accomplished through the establishment of sampling sites that are representative of the waterbody and which can be revisited approximately every eight years. This information will provide time relevant information for use in CWA Section 303(d) listing and 305(b) report assessments and to support the need for developing TMDLs. The approach provides:

- a systematic, detailed review of water quality data which allows for a more efficient use of limited monitoring resources;
- information at a scale where implementation of corrective activities is feasible;
- an established order of rotation and predictable sampling in each basin which allows for enhanced coordinated efforts with other programs; and
- program efficiency and improvements in the basis for management decisions.

It should be noted that a watershed would not be ignored during the years in between water quality surveys. The rotating basin program will be supplemented with other data collection efforts such as on-going studies being performed by the USGS and USEPA. Data will be analyzed and field studies will be conducted to further characterize acknowledged problems and TMDLs will be developed and implemented accordingly. Both long-term and intensive field studies can contribute to the State's Integrated §303(d)/§305(b) listing process for waters requiring TMDLs.

5.0 IMPLEMENTATION OF TMDLS

5.1 Point Sources and NPDES Permitting

There are no NPDES permits in the watersheds discussed in this TMDL.

5.2 Nonpoint Sources – WBP and BMP Coordination

Public awareness and involvement will be crucial to the successful implementation of these plans and improved water quality. Staff from SWQB will work with stakeholders to provide guidance in developing a Watershed-Based Plan (WBP). The WBP is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies in reducing and preventing nonpoint source impacts to water quality. This long-range strategy will become instrumental in coordinating efforts to achieve water quality standards in the watershed. The WBP is essentially the Implementation Plan, or Phase Two of the TMDL process. The completion of the TMDLs and WBP leads directly to the development of on-the-ground projects to address surface water impairments in the watershed. SWQB has so far worked with Amigos Bravos, Truchas Land Grant, USFS, and National Resources Conservation Service on watershed projects in the Upper Rio Grande basin.

The Watershed Protection Section of the SWQB provides Clean Water Act (CWA) §319(h) funding to assist in implementation of BMPs to address water quality problems on reaches listed as category 4 or 5 waters on the Integrated §303(d)/ §305(b) List. These monies are available to all private, for profit and nonprofit organizations that are authenticated legal entities, or governmental jurisdictions including: cities, counties, tribal entities, Federal agencies, or agencies of the State. Proposals are submitted by applicants each year through a Request for Proposal (RFP) process and require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Funding is available for both watershed group formation (which includes WBP development) and on-the-ground projects to improve surface water quality and associated habitat. Further information on funding from the CWA §319 (h) can be found at the SWQB website: http://www.nmenv.state.nm.us/swqb/.

SWQB staff will assist with any technical assistance such as selection and application of BMPs needed to meet WBP goals. Stakeholder public outreach and involvement in the implementation of this TMDL will be ongoing. Stakeholders in this process will include SWQB and other members of the WBP.

Nonpoint source *E.coli* impairments in the Upper Rio Grande basin may be addressed through livestock management. Providing an alternate water source and fencing can remove the livestock and other ungulates from the riparian area. Rotational grazing as part of a sound grazing management plan may also improve the water quality in the watershed. Outreach to the stakeholders about land management and septic system maintenance can also be an important tool in reducing the *E.coli* load in the watershed.

6.0 APPLICABLE REGULATIONS and STAKEHOLDER ASSURANCES

New Mexico's Water Quality Act (Act) authorizes the WQCC to "promulgate and publish regulation to prevent or abate water pollution in the state" and to require permits. The Act authorizes a constituent agency to take enforcement action against any person who violates a water quality standard. Several statutory provisions on nuisance law could also be applied to NPS water pollution. The Water Quality Act also states in §74-6-12(a):

> *The Water Quality Act (this article) does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights.*

In addition, the State of New Mexico Surface Water Quality Standards (see Subsection C of 20.6.4.6 NMAC) (NMAC 2012) states:

> *Pursuant to Subsection A of Section 74-6-12 NMSA 1978, this part does not grant to the water quality control commission or to any other entity the power to take away or modify property rights in water.*

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

> *It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act. It is the further policy of Congress that nothing in this Act shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.*

New Mexico's CWA §319 Program has been developed in a coordinated manner with the State's 303(d) process. All 319 watersheds that are targeted in the annual RFP process coincide with the State's biennial impaired waters list as approved by USEPA. The State has given a high priority for funding, assessment, and restoration activities to these watersheds.

As a constituent agency, NMED has the authority under Chapter 74, Article 6-10 NMSA 1978 to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard including a violation caused by a NPS. The NMED NPS water quality management program has historically strived for and will continue to promote voluntary compliance to NPS water pollution concerns by utilizing a voluntary, cooperative approach. The State provides technical support and grant monies for implementation of BMPs and other NPS prevention mechanisms through §319 of the Clean Water Act. Since portions of this TMDL will be implemented through NPS control mechanisms, the New Mexico Watershed Protection Program will target efforts to this and other watersheds with TMDLs.

In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including federal, state and private land, NMED has established Memoranda of Understanding (MOUs) with various federal agencies, in particular the Forest Service and the Bureau of Land Management. MOUs have also been developed with other state agencies, such as the New Mexico Department of Transportation. These MOUs provide for coordination and consistency in dealing with NPS issues.

The time required to attain standards for all reaches is estimated to be approximately 10-20 years. This estimate is based on a five-year time frame implementing several watershed projects that may not be starting immediately or may be in response to earlier projects. Stakeholders in this process will include SWQB, and other parties identified in the WBP. The cooperation of watershed stakeholders will be pivotal in the implementation of these TMDLs as well.

7.0 PUBLIC PARTICIPATION

Public participation will be solicited in development of this TMDL (see **Appendix B**). The draft Upper Rio Grande TMDL was first made available for a 30-day comment period beginning on June 13, 2012 and a public meeting was held on June 28, 2012 at the Taos Convention Center from 6-8pm. Response to public comments is included as Appendix D of the TMDL.

Once the TMDL is approved by the Water Quality Control Commission, the next step for public participation is revision of the WBP as described in Section 6.0 and participation in watershed protection projects including those that may be funded by Clean Water Act Section 319(h) grants. The WBP development process is open to any member of the public who wants to participate.

8.0 REFERENCES

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APPENDIX A

PROBABLE SOURCES OF IMPAIRMENT

"Sources" are defined as activities that may contribute pollutants or stressors to a water body (USEPA 1997). The list of "Probable Sources of Impairment" in the [Integrated 303(d)/305(b) List](), [Total Maximum Daily Load]() documents (TMDL's), and Watershed-Based Plans (WBP's) is intended to include any and all activities that could be contributing to the identified cause of impairment. Data on Probable Sources is routinely gathered by Monitoring and Assessment Section staff and Watershed Protection Section staff during water quality surveys and watershed restoration projects and is housed in the Assessment Database (ADB version 2). ADB was developed by USEPA to help states manage information on surface water impairment and to generate §303(d)/ §305(b) reports and statistics. More specific information on Probable Sources of Impairment is provided in individual watershed planning documents (e.g., TMDL's, WBP's, etc) as they are prepared to address individual impairments by assessment unit.

USEPA through guidance documents strongly encourages states to include a list of Probable Sources for each listed impairment. According to the 1998 305(b) report guidance, "…, states must always provide aggregate source category totals…" in the biennial submittal that fulfills CWA section 305(b)(1)(C) through (E) (USEPA 1997). The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled "Probable" and generally includes several sources for each known impairment.

The approach for identifying "Probable Sources of Impairment" was recently modified by SWQB. Any new impairment listing will be assigned a Probable Source of "Source Unknown." Probable Source Sheets will continue to be filled out during watershed surveys and watershed restoration activities by SWQB staff. Information gathered from the Probable Source Sheets will be used to generate a draft Probable Source list in consequent TMDL planning documents. These draft Probable Source lists will be finalized with watershed group/stakeholder input during the pre-survey public meeting, TMDL public meeting, WBP development, and various public comment periods. The final Probable Source list in the approved TMDL will be used to update the subsequent Integrated List.

Literature Cited:

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Figure A1. Probable Source Development Process and Public Participation Flowchart

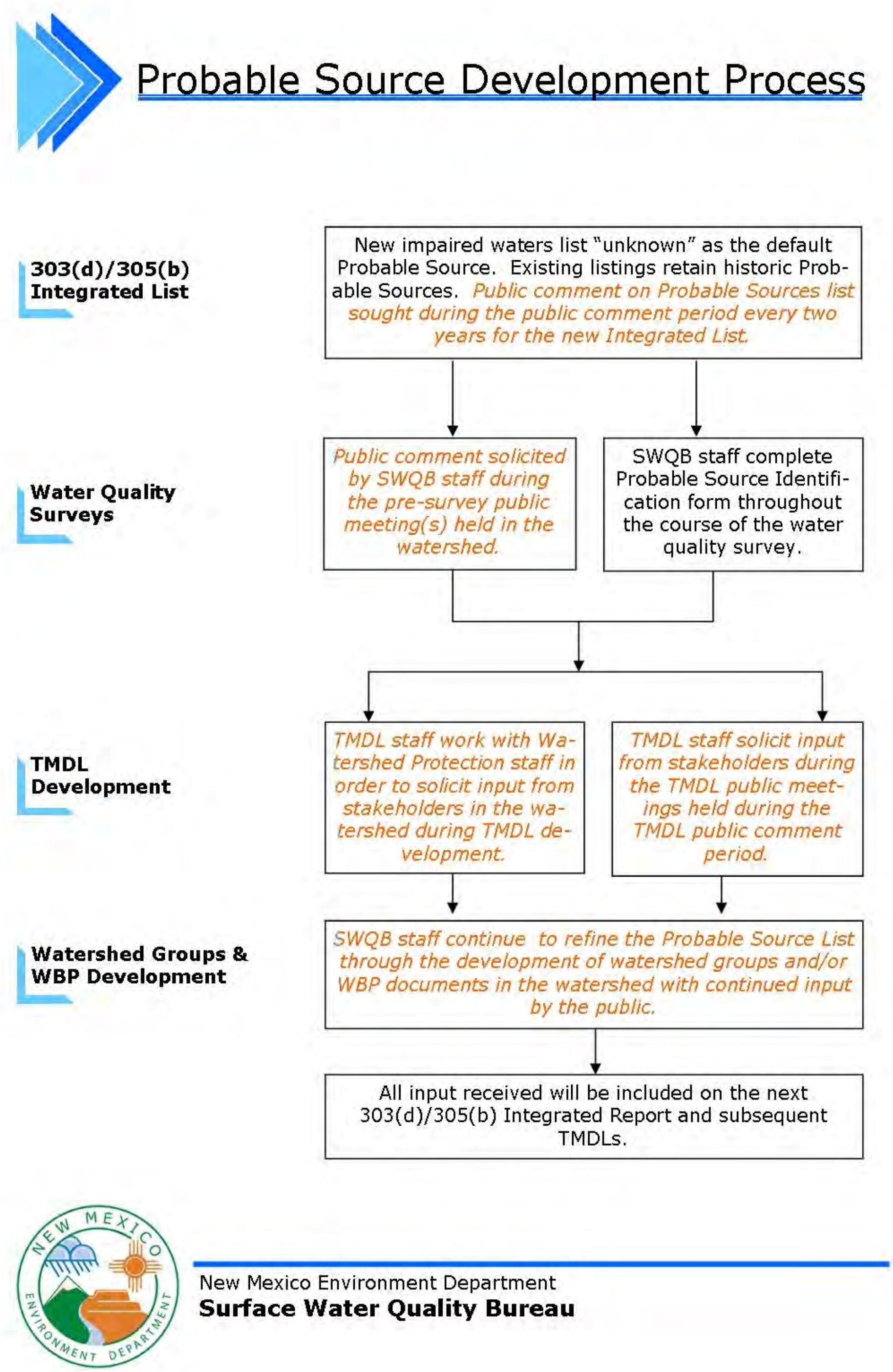

Figure A2. Probable Source Identification Sheet for the Public

Help Us Identify Probable Sources of Impairment

Name:
Phone Number (optional):
Email or Mailing Address (optional):
Date:
Waterbody Name/ Watershed Name/ Location of concern:

From the list below, please check the items you believe are sources of water quality impairment in the watershed or waterbody of concern. In the spaces next to each item you check, please use the following scale to indicate how much of a concern that item is to you by specifying a number between 1 and 3.

(1 - Slight Concern) (2 – Moderate Concern) (3 – High Concern)

✓	ACTIVITY	Scale of Concern			✓	ACTIVITY	Scale of Concern		
☐	Feedlots	1	2	3	☐	Pavement and Other Impervious Surfaces	1	2	3
☐	Livestock Grazing	1	2	3	☐	Roads/Bridges/Culverts	1	2	3
☐	Agriculture	1	2	3	☐	Habitat Modification(s)	1	2	3
☐	Flow Alterations (water withdrawal)	1	2	3	☐	Mining/Resource Extraction	1	2	3
☐	Stream/River Modification(s)	1	2	3	☐	Logging/Forestry Operations	1	2	3
☐	Storm Water Runoff	1	2	3	☐	Housing or Land Development	1	2	3
☐	Flooding	1	2	3	☐	Exotic species	1	2	3
☐	Landfill(s)	1	2	3	☐	Waterfowl	1	2	3
☐	Industry/Wastewater Treatment Plant	1	2	3	☐	Wildlife and domesticated animals other than waterfowl	1	2	3
☐	Inappropriate Waste Disposal	1	2	3	☐	Recreational Use	1	2	3
☐	Improperly maintained Septic Systems	1	2	3	☐	Natural Disturbances *(please describe)*	1	2	3
☐	Other: *(please describe)*	1	2	3	☐	Other: *(please describe)*	1	2	3

Comments:

Figure A3. Probable Source Identification Sheet for NMED and Other Agencies

16 Mar 09

Ver. 2

Probable Source Field Sheet & Site Condition Class Verification

Station ID:	Station Name/Description:	
Field Crew:	Comments:	
Date:	Watershed protection staff reviewer:	Date of WPS review:
WQS Segment from 20.6.4 NMAC:	Assessment Unit:	

Score the proximity and certainty of occurance of the following activities in the watershed upstream of the site. Consult with the appropriate staff at NMED and other agencies to score shaded cells. Fill out after recon during 1st or 2nd site visit, review and revise at the end of the survey, and have it reviewed by Watershed Protection Staff with knowledge of the particular watershed. Maintain completed forms in Survey Binder.

Activity Checklist

Agriculture					**Silviculture**				
Permitted CAFOs	0	1	3	5	Logging Ops – Active Harvesting	0	1	3	5
Crop Production (Cropland or Dry Land)	0	1	3	5	Logging Ops – Legacy	0	1	3	5
Drains	0	1	3	5	Fire Suppression (Thinning/Chemicals)	0	1	3	5
Irrigated Crop Production (Irrigation Equip)	0	1	3	5	Other:	0	1	3	5
Permitted Aquaculture	0	1	3	5	**Hydromodifications**				
Other:	0	1	3	5	Channelization	0	1	3	5
Rangeland					Dams/Diversions	0	1	3	5
Livestock Grazing or Feeding Operation	0	1	3	5	Draining/Filling Wetlands	0	1	3	5
Rangeland Grazing (dispersed)	0	1	3	5	Dredging	0	1	3	5
Other:	0	1	3	5	Irrigation Return Drains	0	1	3	5
Industrial/ Municipal					Riprap/Wall/Dike/Jetty Jack -- circle	0	1	3	5
Industrial Stormwater Discharge (permitted)	0	1	3	5	Flow Alteration (from Water Diversions/Dam Ops – circle)	0	1	3	5
Storm water Runoff due to Construction	0	1	3	5	Highway/Road/Bridge Runoff	0	1	3	5
Industrial Point Source Discharge	0	1	3	5	Other:	0	1	3	5
Landfill	0	1	3	5	**Miscellaneous**				
Municipal Point Source Discharge	0	1	3	5	Angling Pressure	0	1	3	5
On-Site Treatment Systems (Septic, etc.)	0	1	3	5	Dumping/Garbage/Trash/Litter	0	1	3	5
Pavement/ /Impervious Surfaces	0	1	3	5	Exotic Plant Species	0	1	3	5
Inappropriate Waste Disposal	0	1	3	5	Fish Stocking	0	1	3	5
RCRA/Superfund Site	0	1	3	5	Hiking Trails	0	1	3	5
Residences/Buildings	0	1	3	5	Campgrounds (Dispersed/Defined – circle)	0	1	3	5
Site Clearance (Land Development)	0	1	3	5	Surface Films/Odors	0	1	3	5
Urban Runoff/Storm Sewers	0	1	3	5	Pesticide Application (Algaecide/Insecticide)	0	1	3	5
Power Plants	0	1	3	5	Waste From Pets (high concentration)	0	1	3	5
Other:	0	1	3	5	Other:	0	1	3	5
Resource Extraction					**Habitat Modification**				
Abandoned Mines (Inactive)/Tailings	0	1	3	5	Exotics Removal	0	1	3	5
Acid Mine Drainage	0	1	3	5	Incised	0	1	3	5
Active Mines (Placer/Potash/Other -- circle)	0	1	3	5	Mass Wasting	0	1	3	5
Oil/Gas Activities (Permitted/Legacy – circle)	0	1	3	5	Restoration	0	1	3	5
Reclamation of Inactive Mines	0	1	3	5	Other:	0	1	3	5
Other:	0	1	3	5	**Natural Disturbance or Occurrence**				
Roads					Waterfowl	0	1	3	5
Bridges/Culverts/RR Crossings	0	1	3	5	Drought-related Impacts	0	1	3	5
Low Water Crossing	0	1	3	5	Watershed Runoff Following Forest Fire	0	1	3	5
Paved Roads	0	1	3	5	Recent Bankfull or Overbank Flows	0	1	3	5
Gravel or Dirt Roads	0	1	3	5	Wildlife other than Waterfowl	0	1	3	5
Other:	0	1	3	5	Other Natural Sources:	0	1	3	5

Legend – Proximity Score

Activity believed to be Absent	0	Activity observed or known to be present within 1 km of the channel	3
Activity believed to be present in Watershed	1	Activity observed or known to be present in the riparian zone	5

APPENDIX B

PUBLIC PARTICIPATION FLOWCHART

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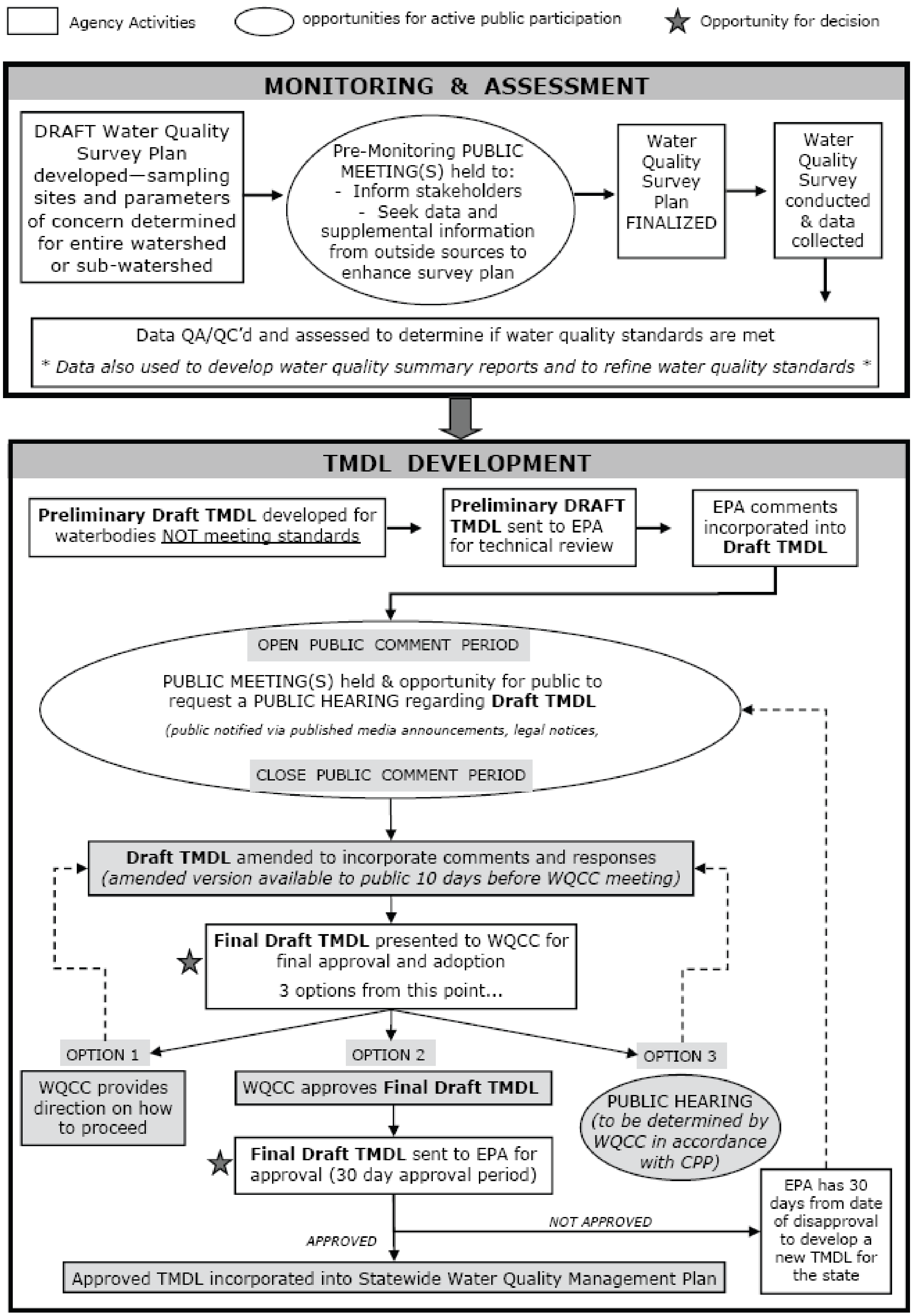
Monitoring, Assessment, & TMDL Development Process



APPENDIX C

E.COLI AND FLOW DATA

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Table C.1 Apache Canyon (Rio Fernando de Taos to headwaters)

Sampling site*	Date	Discharge (cfs)	E.coli (cfu/100 mL)
APC01	5/8/2007	0.64	3.1
APC01	6/11/2007	0.03	6.3
APC01	7/18/2007	0.004	156.5
APC01	7/18/2007	0.004	122.3
APC01	8/30/2007	0.006	25.6
APC01	7/21/2009	0.002	405.2
APC02	5/8/2007	1.66	2
APC02	6/11/2007	0.18	5.2
APC02	7/18/2007	0.02	5.2
APC02	8/30/2007	0.02	34.5
APC02	10/18/2007	0.02	1
APC02	7/22/2009	0.009	802
APC02	8/13/2009	0.003	206.4
APC02	9/2/2009	0.005	11
APC02	4/13/10	1.31	6
APC02	5/13/10	1.5	2
APC02	6/15/10	0.02	25
APC02	7/21/10	0.012	687
APC02	7/21/10	0.012	727
APC02	9/09/10	0.012	345
APC02	9/09/10	0.012	261

*USFS sampling sites

Table C.2 Rio Fernando de Taos (Tienditas Creek to headwaters)

Sampling site*	Date	Flow	Flow unit	E.coli (cfu/100 mL)
28RFerna031.7	3/19/2009	n/a	n/a	1
28RFerna031.7	5/19/2009	n/a	n/a	2
28RFerna031.7	8/17/2009	n/a	n/a	648.8
28RFerna031.7	9/22/2009	n/a	n/a	1732.9
NMED09	7/21/2009	0	gpm	578
NMED09	7/22/2009	0.25	gpm	>802
NMED09	9/2/2009	0	gpm	---
NMED09	04/13/10	5.41	cfs	4
NMED09	05/13/10	5.6	cfs	7
NMED09	06/15/10	0.15	cfs	115
NMED09	07/21/10	0.01	cfs	921
NMED09	09/09/10	0.001	cfs	> 2419.6
NMED09	8/13/09A	0	gpm	>2419.6
NMED09	8/13/09B	0	gpm	980.4
RFDT01	5/8/2007	1.27	cfs	6.3
RFDT01	6/11/2007	0.34	cfs	19.9
RFDT01	7/18/2007	0.08	cfs	34.1
RFDT01	8/30/2007	0.16	cfs	1986.3
RFDT01	10/18/2007	0.09	cfs	54.6
RFDT01	7/21/2009	1.5 (1)	gpm	162.4
RFDT01	7/21/2009	1.5 (1)	gpm	129.6
RFDT01	7/22/2009	2.0 (2)	gpm	>802
RFDT01	7/22/2009	2.0 (2)	gpm	>802
RFDT01	8/13/2009	1.0 (1)	gpm	1732.9
RFDT01	8/13/2009	1.0 (1)	gpm	1413.6
RFDT01	9/2/2009	3	gpm	648.8
RFDT01	04/13/10	41	cfs	9
RFDT01	04/13/10	41	cfs	3
RFDT01	05/13/10	2.6	cfs	0
RFDT01	06/15/10	0.17	cfs	26
RFDT01	07/21/10	0.04	cfs	461
RFDT01	09/09/10	0.01	cfs	13

Sampling site*	Date	Flow	Flow unit	E.coli (cfu/100 mL)
RFDT02	5/8/2007	1.37	cfs	13.4
RFDT02	7/18/2007	0.14	cfs	206.4
RFDT02	8/30/2007	0.34	cfs	1732.9
RFDT02	10/18/2007	0.07	cfs	27.2
RFDT02	7/21/2009	0	gpm	---
RFDT02	7/22/2009	0.25	gpm	>802
RFDT02	8/13/2009	0	gpm	---
RFDT02	9/2/2009	0	gpm	---
RFDT02	04/13/10	4.71	cfs	7
RFDT02	05/13/10	2.7	cfs	22
RFDT02	05/13/10		cfs	12
RFDT02	06/15/10	0.19	cfs	101
RFDT02	07/21/10	0.03	cfs	921
RFDT02	09/09/10	dry	cfs	---
RFDT02A	6/11/2007	0.55	cfs	488.4
RFDT02B	6/11/2007	0.55	cfs	387.3
RFDT03	5/8/2007	2.09	cfs	4.1
RFDT03	6/11/2007	0.33	cfs	686.7
RFDT03	7/18/2007	0.08	cfs	920.8
RFDT03	8/30/2007	0.26	cfs	1986.3
RFDT03	10/18/2007	0.03	cfs	10.9
RFDT03	7/21/2009	0	gpm	---
RFDT03	7/22/2009	0	gpm	---
RFDT03	8/13/2009	0	gpm	---
RFDT03	9/2/2009	0	gpm	---
RFDT03	04/13/10	4.71	cfs	6
RFDT03	05/13/10	3.8	cfs	15
RFDT03	06/15/10	0.16	cfs	119
RFDT03	06/15/10		cfs	105

Sampling site*	Date	Flow	Flow unit	E.coli (cfu/100 mL)
RFDT03	07/21/10	dry	cfs	---
RFDT03	09/09/10	dry	cfs	---
28RFerna031.7	3/19/2009	0.3	cfs	1
28RFerna031.7	5/19/2009	0.4	cfs	2
28RFerna031.7	8/17/2009	n/a	cfs	648.8
28RFerna031.7	9/22/2009	0.1	cfs	1732.9

*SWQB and USFS sites

Table C.3 Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon)

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
28RFerna000.3	3/24/2009	3.82	0
28RFerna000.3	5/19/2009	3.44	178.5
28RFerna000.3	7/14/2009	0.65	n/a
28RFerna000.3	8/17/2009	1.5	78.5
28RFerna000.3	9/22/2009	2.14	88.4
28RFerna003.2	8/17/2009	n/a	93.4
28RFerna003.2	9/22/2009	n/a	214.3
28RFerna003.2	10/13/2009	n/a	2419.6
F3	05/25/06	n/a	4
F3	06/30/06	n/a	10
F3	05/21/07	n/a	36
F3	03/10/08	n/a	6.3
F3	06/10/08	n/a	290
F3	05/26/10	n/a	4
F3	07/01/10	n/a	10
F4 = SWQB 003.2	05/25/06	n/a	4
F4 = SWQB 003.2	06/30/06	n/a	420
F4 = SWQB 003.2	10/19/06	n/a	264
F4 = SWQB 003.2	05/21/07	n/a	40
F4 = SWQB 003.2	07/24/07	n/a	48
F4 = SWQB 003.2	03/10/08	n/a	16.1
F4 = SWQB 003.2	06/10/08	n/a	288

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
F4 = SWQB 003.2	07/22/08	n/a	610
F4 = SWQB 003.2	09/15/08	n/a	111
F4 = SWQB 003.2	06/02/09	n/a	> 2419.6
F4 = SWQB 003.2	11/06/09	n/a	62
F4 = SWQB 003.2	05/26/10	n/a	4
F4 = SWQB 003.2	07/01/10	n/a	420
F4 = SWQB 003.2	10/20/10	n/a	264
F4 = SWQB 003.2	05/25/11	n/a	388

*SWQB and Amigos Bravos sites

Table C.4 Rio Fernando de Taos (USFS bnd to canyon at Tienditas Creek)

Sampling site*	Date	Discharge	Discharge unit	E.coli (cfu/100 mL)
F1	10/19/2006	n/a	n/a	12
F1	5/21/2007	n/a	n/a	18
F1	7/24/2007	n/a	n/a	28
F1	9/19/2007	n/a	n/a	55
F1	12/3/2007	n/a	n/a	2
F1	3/10/2008	n/a	n/a	1
F1	3/10/2008	n/a	n/a	1
F1	6/10/2008	n/a	n/a	310
F1	7/22/2008	n/a	n/a	596
F1	9/15/2008	n/a	n/a	28
F1	6/2/2009	n/a	n/a	16
F1	11/6/2009	n/a	n/a	14
F1	10/20/10	n/a	n/a	12
F1	5/25/2006	n/a	n/a	1
F1	05/26/10	n/a	n/a	1
F1	5/24/2011	n/a	n/a	268
F1A	5/25/2006	n/a	n/a	0
F1A	6/30/2006	n/a	n/a	318
F1A	12/3/2007	n/a	n/a	28.5
F1A	6/2/2009	n/a	n/a	94
F1A	11/6/2009	n/a	n/a	38

Sampling site*	Date	Discharge	Discharge unit	E.coli (cfu/100 mL)
F1A	05/26/10	n/a	n/a	0
F1A	07/01/10	n/a	n/a	318
F1A	5/24/2011	n/a	n/a	52
F1B	05/25/06	n/a	n/a	6
F1B	06/30/06	n/a	n/a	56
F1B	12/03/07	n/a	n/a	8.6
F1B	03/10/08	n/a	n/a	2
F1B	06/10/08	n/a	n/a	260
F1B	07/22/08	n/a	n/a	180
F1B	09/15/08	n/a	n/a	4
F1B	06/02/09	n/a	n/a	18
F1B	11/06/09	n/a	n/a	41
F1B	05/26/10	n/a	n/a	6
F1B	07/01/10	n/a	n/a	56
RFDT04	5/8/2007	12.24	cfs	18.5
RFDT04	6/11/2007	4.8	cfs	98.8
RFDT04	7/18/2007	1.14	cfs	387.3
RFDT04	8/30/2007	1.3	cfs	1299.7
RFDT04	10/18/2007	0.86	cfs	53.6
RFDT05	5/8/2007	13.98	cfs	26.5

Sampling site*	Date	Discharge	Discharge unit	E.coli (cfu/100 mL)
RFDT05	6/11/2007	6.5	cfs	80.5
RFDT05	7/18/2007	1.61	cfs	55.6
RFDT05	8/30/2007	1.38	cfs	193.5
RFDT05A	10/18/2007	1.22	cfs	<1
RFDT05B	10/18/2007	1.22	cfs	4.1
RFDT06	5/8/2007	22.15	cfs	90.6
RFDT06	6/11/2007	6.7	cfs	58.6
RFDT06	7/18/2007	2.51	cfs	63.1
RFDT06	8/30/2007	0.74	cfs	61.3
RFDT06	8/30/2007	0.74	cfs	52.9
RFDT06	10/18/2007	1.21	cfs	11.9

*SWQB, USFS, and Amigos Bravos sites

Table C.5 Rio Pueblo de Taos (Rio Grande del Rancho to Taos Pueblo bnd)

Sample site*	Date	Discharge (cfs)	E.coli (cfu/100 mL)
28RPuebT013.2	3/24/2009	59.85	9.2
28RPuebT013.2	4/21/2009	55.68	43.9
28RPuebT013.2	5/19/2009	n/a	n/a
28RPuebT013.2	6/17/2009	n/a	n/a
28RPuebT013.2	7/14/2009	n/a	n/a
28RPuebT013.2	8/17/2009	7.61	45.0
28RPuebT013.2	9/22/2009	11.57	61.3
28RPuebT013.2	10/12/2009	n/a	n/a
28RPuebT015.8	3/24/2009	n/a	n/a
28RPuebT015.8	4/21/2009	n/a	n/a
28RPuebT015.8	5/19/2009	n/a	n/a
28RPuebT015.8	6/17/2009	n/a	n/a
28RPuebT015.8	7/14/2009	n/a	n/a
28RPuebT015.8	9/22/2009	n/a	n/a
28RPuebT015.8	10/12/2009	n/a	n/a
P1	5/25/2006	n/a	1.0
P1	6/30/2006	n/a	2.0
P1	5/21/2007	n/a	0.0
P1	7/24/2007	n/a	98.0
P1	9/19/2007	n/a	5.0
P1	12/3/2007	n/a	5.2
P1	3/10/2008	n/a	<1
P1	6/10/2008	n/a	6.0
P1	9/15/2008	n/a	33.0

Sample site*	Date	Discharge (cfs)	E.coli (cfu/100 mL)
P1	6/2/2009	n/a	60.0
P1	11/6/2009	n/a	38.0
P1	5/26/2010	n/a	1.0
P1	6/30/2010	n/a	
P1	7/1/2010	n/a	2.0
P1A (spring 100 ft from RP d T)	5/25/2006	n/a	0.0
P1A (spring 100 ft from RP d T)	6/30/2006	n/a	> 2419.6
P1A (spring 100 ft from RP d T)	10/19/2006	n/a	312.0
P1A (spring 100 ft from RP d T)	12/3/2007	n/a	7.5
P1A (spring 100 ft from RP d T)	3/10/2008	n/a	<1
P1A (spring 100 ft from RP d T)	6/10/2008	n/a	20.0
P1A (spring 100 ft from RP d T)	7/22/2008	n/a	48.0
P1A (spring 100 ft from RP d T)	9/15/2008	n/a	20.0
P1A (spring 100 ft from RP d T)	5/26/2010	n/a	0.0
P1A (spring 100 ft from RP d T)	7/1/2010	n/a	> 2419.6
P1A (spring 100 ft from RP d T)	10/20/2010	n/a	312.0
P1A (spring 100 ft from RP d T)	5/25/2011	n/a	1336.0
P1B	12/3/2007	n/a	29.8
P1B	3/10/2008	n/a	5.2
P1C	3/10/2008	n/a	4.1
P1C	6/10/2008	n/a	148.0
P1C	7/22/2008	n/a	34.0

Sample site*	Date	Discharge (cfs)	E.coli (cfu/100 mL)
P1C	9/15/2008	n/a	37.0
P2	6/10/2000	n/a	88.0
P2	5/21/2007	n/a	665.0
P2	7/24/2007	n/a	62.0
P2	9/19/2007	n/a	9.0
P2	12/3/2007	n/a	435.2
P2	3/10/2008	n/a	7.4
P2	7/22/2008	n/a	260.0
P2	6/2/2009	n/a	240.0
P2	11/6/2009	n/a	59.0
P2	5/25/2011	n/a	49.0

*SWQB and Amigos Bravos sites

Table C.6 Rio Quemado (Santa Cruz River to Rio Arriba Cnty bnd)

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
28RQuema003.1	3/26/2009	8.94	53.8
28RQuema003.1	5/21/2009	22.9	185
28RQuema003.1	7/16/2009	0.21	298.7
28RQuema003.1	9/23/2009	0.79	248.9

Table C.7 Rio San Antonio (Montoya Canyon to headwaters)

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
27RSanAn025.3	4/14/2009	36.02	2
27RSanAn025.3	6/9/2009	6.21	517.2
27RSanAn025.3	8/10/2009	1.42	248.9
27RSanAn025.3	10/6/2009	2.89	325.5

Table C.8 Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd)

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
28RSanBa000.2	3/25/2009	12.74	7.5
28RSanBa000.2	5/20/2009	92.01	185
28RSanBa000.2	6/16/2009	29.21	307.6
28RSanBa000.2	7/15/2009	2.91	122.3
28RSanBa000.2	8/18/2009	1.65	248.1
28RSanBa000.2	9/24/2009	11.58*	387.3
28RSanBa000.2	10/14/2009	10.5	60.2

*9/27/2009 discharge measurement

Table C.9 Santa Cruz River (Santa Clara Pueblo bnd to Santa Cruz Dam)

Sampling site	Date	Discharge (cfs)	E.coli (cfu/100 mL)
28SanCru004.2	3/26/2009	36.85	29.5
28SanCru004.2	4/22/2009	82.99	110
28SanCru004.2	7/16/2009	31.78	1046.2
28SanCru004.2	9/23/2009	57.73	290.9
28SanCru004.2	10/15/2009	n/a	2419.6

APPENDIX D

PUBLIC COMMENTS

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SWQB hosted a public meeting in Taos, NM on June 28, 2012 to discuss the Public Comment Draft Upper Rio Grande Watershed TMDL. Notes from the public meeting are available in the SWQB Administrative Record.

Written comments received during the 30-day public comment period:

A. Rachel Conn, Amigos Bravos
B. Jerry Yeargin, Taos Canyon resident
C. Diana M. Trujillo, Carson National Forest
D. Dr. M. Lyndsay Remerowski, Dr Douglas Eib, Don Carlson
E. Jeanne Green, El Prado resident

Comment Set A

AMIGOS BRAVOS *Friends of the Wild Rivers*
P.O. Box 238, Taos, NM 87571
Telephone: 575.758.3474
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June 27, 2012

Heidi Henderson
NMED SWQB
P.O. Box 26110
Santa Fe, NM 87502
Heidi.henderson@state.nm.us.

Via Electronic Mail: Heidi.henderson@state.nm.us

RE: E.coli TMDLs for the upper Rio Grande

Dear Ms. Henderson,

Amigos Bravos is a statewide river conservation organization guided by social justice principles. Our mission is to protect and restore the rivers of New Mexico, and ensure that those rivers provide a reliable source of clean water to the communities and farmers that depend on them, as well as a safe place to swim, fish, and go boating. Amigos Bravos works locally, statewide, and nationally to ensure that the waters of New Mexico are protected by the best policy and regulations possible. In this capacity Amigos Bravos works to make sure that New Mexico's water quality standards are protective enough to support the diverse human and non-human uses of our state's water resources. A TMDL is the first and often most critical step in cleaning up a waterbody as all other steps in the restoration process such as watershed planning and restoration projects pivot off the information provided in the TMDL. Therefore advocating for comprehensive and accurate TMDLs is a critical component of our work to protect clean water and the cultures that depend upon it here in New Mexico. We would like to communicate the following comments regarding the draft E.coli TMDLs for the upper Rio Grande.

Monitoring Data

It is Amigos Bravos' understanding that both Forest Service and Amigos Bravos and Sentinels Rios de Taos data was used to determine the impairment status of the Rio Fernando (USFS and AB/SRdT) and of the Rio Pueblo (AB/SRdT). The draft TMDL makes no mention of this. The fact that these parties submitted data that was used in the assessment process for these streams should be mentioned in section 2.4 of the TMDL.

New Mexico TMDLs – More Data Needed

While Amigos Bravos was encouraged to see the large data sets (18-46 samples) that were used to determine impairment for the Rio Pueblo and Rio Fernando, we are aware that the large data set is in a large part due to monitoring data that Amigos Bravos and Sentinels Rios de Taos have collected over the last 5 years. This is confirmed by the much smaller data sets (4-7 samples) that were used to determine impairment for the other rivers in the draft document for which AB/SRdT did not collect data. Generally Amigos Bravos has a concern about the small data sets that are used to develop TMDLs across the state. Typically, as we understand it, during TMDL development NMED does not gather additional water quality data from what they used to make an assessment determination. This assessment data is simply, in most cases, not enough information to draft an accurate, useful TMDL document.

Amigos Bravos is especially concerned about Temperature TMDLS and the use of one or two densitometer readings in the SSTEMP modeling program. We have found in our fieldwork that making assumptions about canopy coverage from one or two sites is inaccurate to the point of being meaningless. When this data is then added into the SSTEMP model it throws off the entire model result. In addition, more types of data, such as aspect and other site-specific factors that can have a big impact or loading predictions, should be collected and entered into the model. For E.coli TMDLs, Amigos Bravos is concerned about the method to determine flow (see below comments under Flow).

Overall TMDL development should involve new data gathering and more detailed study of the stream to ensure that the final document provides an accurate picture of what is occurring in the stream system.

Rio Santa Barbara

Amigos Bravos was not aware that the Rio Santa Barbara was impaired for E.coli. The current EPA approved 305b/303d Report does not mention this impairment. What data is being used for the TMDL, and is it different from the data that was used to develop the 305b/303d Report? If there is data to support an impairment listing, the 305b/303d list should be updated to include this impairment to ensure that the public is aware of the problem.

Flow/Climate Change

In section 3.2, page 24 the draft TDML states “water quality standard exceedences for these waters occurred during lower flows”. It would be useful for future planning and restoration purposes to have the TMDL present the percentage of exceedences that occurred during low flow conditions as well as presenting (perhaps in a table format) the actual flows and dates of flows when exceedences occurred. Perhaps this data doesn’t exist, which in of itself is troubling. In addition, the use of average precipitation for low flow calculations is problematic, especially if a historical average that goes substantially back into the past is being used. As we experience the impacts of climate change we are expected to see more frequent and severe low flow conditions. Looking at the hydrographs of 2009 flows compared to historical averages is a case in point. Therefore using historical precipitation averages will very likely not accurately depict the low flow conditions in a waterbody and could result in too high (not protective enough) TMDLs. Somehow the impacts of climate change and lower flows should be incorporated into the TMDL. This may mean increasing the margin of safety (MOS) or gathering field data on flow for several years prior to TMDL development and somehow determining an equation to factor in increasing lower flow trends. For this draft TMDL, a greater MOS of safety should be used since gathering flow data and determining a method for factoring in this data into flow predictions will take time to gather and develop.

Elevation

The draft TMDL lists the average elevation of the Rio Fernando de Taos (Rio Pueblo de Taos to USFS bnd at canyon) as 8970 ft. and the average elevation of the Rio Pueblo de Taos (Rio Grande del Rancho to Taos Pueblo Bnd) as 6761 ft. These two stream segments both run through the center of Taos and while the Rio Fernando segment may extend a little bit higher into the foothills, the difference in average elevation could not possibly be 2,000 feet.

Arithmetic Mean Used in Existing Load Calculations

Amigos Bravos is aware of several samples in the upper Rio Fernando stretch (Tienditas Creek to Headwaters) and Apache Canyon that exceeded the applied dilution level ability to quantify the amount of E.coli. (samples were >1000 cfu/100ml). How was this taken into account when calculating the arithmetic mean? At the very least a note should be made in the document acknowledging that the arithmetic mean may be low. In addition while perhaps not under the purview of this TMDL document, Amigos Bravos encourages NMED to set up protocols to capture the actual levels of E.coli in stream systems when there has been a history of E.coli levels exceeding the detection range. This may entail taking two samples at these sites (with different dilution factors).

Probable Sources

It would useful if the TMDL somehow indicated which couple of the numerous probable sources are the larger concern. In the probable source identification sheet that Amigos Bravos filled out and submitted to NMED there was a ranking system associated with each potential probable source. Presumably NMED also somehow ranked the potential probable sources in your identification process. This information should be included in the TMDL.

E.coli Impairment and Public Notification

During a recent watershed meeting Amigos Bravos was asked by a stakeholder why there isn't signage or some other sort of public notification provided to the public regarding E.coli impairments and potential threats to public health. While we realize that a comprehensive signage program may be too expensive, Amigos Bravos encourages NMED to develop a better public education/notification process for impairments that have the potential to endanger public health such as E.coli. Perhaps this could be in a form of map of E.coli impairments that could be distributed to local officials, public land agencies, and recreation businesses (rafting companies).

Thank you for the opportunity to provide input in and comment on the draft TMDL. We look forward to further discussion about the concerns that we have raised in our comments. Please do not hesitate to contact me at 575-758-3874 or rconn@amigosbravos.org if further clarification or discussion on the above comments is merited or needed.

Sincerely,

Rachel Conn
Projects Director
Amigos Bravos

NMED Response: *Thank you for your comments. The comments will be addressed in the same format as they were submitted.*

- *Monitoring data- Language recognizing the data contributions of Amigos Bravos and USFS was added to Section 2.4.1.*

- *New Mexico TMDLs- More Data Needed- SWQB recognizes that data sets used to determine impairment sometimes do not exceed 8 data points. SWQB recognizes that the data submitted to SWQB by USFS, Amigos Bravos, and Water Sentinels increased the data sets for a number of the assessment units addressed in the TMDL. However, the May 2011 SWQB Assessment Protocols state that, "A minimum of two data points for field and chemical parameters is necessary to apply the procedures in Section 3.0 in order to determine attainment status for an associated designated use in a particular AU."Additional data collection could be relevant during assessments and impairment determination, but additional data would not change the actual calculated TMDL. The TMDL itself is a calculation of the water quality standard multiplied by the critical flow and a conversion factor.*

  There are cases in which SWQB will collect data for TMDL purposes that are not used during the assessment process. In cases where there is an NPDES permit discharge to an assessment unit, SWQB will generally collect effluent data for future use during the TMDL process if the assessment unit is determined to be impaired. SWQB also collects additional geomorphological data for temperature-impaired streams. While your questions about SSTEMP modeling are outside of the scope of these E.coli TMDLs, SWQB agrees that canopy cover and geomorphological measurements are collected from one sampling reach within an assessment unit and this data collection is supplemented with the use of GIS and aerial photography. SWQB views SSTEMP as a simple tool where the ultimate goal is to reach a healthy water temperature to support the aquatic life use of the assessment unit.

- *Rio Santa Barbara- Assessment of data from the 2009 URG water quality survey indicated that the Rio Santa Barbara (non-pueblo Embudo Ck to USFS bnd) assessment unit was impaired for E.coli, however an data entry error caused it to be left off of the 2012-2014 Integrated List. NMED will include the E.coli impairment on the 2014-2016 Integrated List.*

- *Flow/Climate Change- The SWQB Standard Operating Procedure (SOP) http://www.nmenv.state.nm.us/swqb/SOP/ for flow indicates that staff will measure flow "as close as possible, in relation to location and time, to water quality measurements", or use USGS stream flow gage data if it corresponds to the location and time of the water quality data collection. Flow was measured by SWQB staff during the 2009 URG water quality survey and available flow data has been added to Appendix C.*

  SWQB has used the load duration curve approach to TMDL development in the middle and lower Rio Grande watersheds. The use of duration curves provides a *technical framework for identifying "daily loads" in TMDL development, which accounts for the variable nature of water quality associated with different stream flow rates. Specifically, a maximum daily concentration limit can be used with basic hydrology and a duration curve to identify a TMDL that covers the full range of flow conditions. With this approach, ambient water quality data, taken with some measure or estimate of flow at the time of sampling, can be used to compute an instantaneous load. Using the relative percent exceedence from the flow duration curve that corresponds to the stream discharge at the time the water quality sample was taken, the computed load can be plotted in a duration curve format Loads that plot above the curve indicate an exceedence of the water quality criterion, whereas those below the load duration curve show attainment. The pattern of impairment can be examined to see if it occurs across all flow conditions, corresponds strictly to high flow events, or conversely, only to low flows. However, load duration curves were not used in the development of the URG TMDLs due to the lack of active USGS or other stream flow gages.*

SWQB understands your concern about climate change and its effects on flows. SWQB has not yet determined if a change is needed to the TMDL program to address climate change.

- *<u>Elevation-</u> The mean watershed elevation for Rio Pueblo de Taos (Rio Grande del Rancho to Taos Pueblo Bnd) was corrected to 8930 feet in Table 3.2. The corrected elevation was used to recalculate the 4Q3 value in Table 3.2 and 3.4 and the TMDL calculation in Table 3.3 was also updated. Additionally, Tables 3.5 and 3.6 as well as the Executive Summary table for this assessment unit were also updated to reflect this change.*

- *<u>Arithmetic Mean Used in Existing Load Calculations-</u> When samples were noted as "greater than" a maximum value, that maximum value itself was used to calculate the arithmetic mean calculation. A notation has been added to Table 3.4 to indicate which calculated values include "greater than" values.*

- *<u>Probable sources-</u> Thank you for the suggestion. It is challenging to rank probable sources without a source identification program to quantify individual probable sources. SWQB does not currently have the resources to implement such a program; however, SWQB has made improvement to our probable source identification and documentation in recent years. During water quality surveys, SWQB staff score observed activities in the AU upstream of a water quality sampling station by proximity and intensity (see Probable Source SOP for details: http://www.nmenv.state.nm.us/swqb/SOP/) on field forms. Probable sources of impairment identified on these forms are reviewed and used as a starting point for the development of a draft list of the probable sources of impairment in the TMDL. Probable Sources that scored either a (3) or a (5) proximity/intensity score are included in the draft TMDL unless those sources identified on the forms are reasonably expected not to contribute to a specific impairment (e.g. stream channel incision for an E. coli impairment). In addition, common sources for the particular* *pollutant not identified on the forms but known to occur within the AU may be added to the draft probable source list at the discretion of the TMDL writer or based on other staff/stakeholder input. The draft probable source lists are finalized with public as well as targeted watershed group/stakeholder input during the TMDL public comment period and meeting. SWQB is also in the process of revising our public probable source form to better match our staff process and will consider this comment during that process.*

- *<u>E.coli impairment and public notification-</u> SWQB recognizes the public health impact of E.coli impairments in waterbodies throughout the state. Although public health notifications are outside of the scope of the TMDL process, SWQB would be willing to work with Amigos Bravos on developing a notification process for E.coli impairments every two years when a new Integrated List is released. Based on your comment, SWQB approached the New Mexico Department of Health (DOH) regarding coordinating public awareness about E.coli impairments and working out a process to issue joint press releases. DOH also suggested coordinating with county health alliances that have recently formed throughout the state to inform the public about public health concerns.*

Comment Set B

Comments for upper Rio Grande TMDLs

My name is Jerry Yeargin, and I live in Taos Canyon. I'm a member of Amigos Bravos, which is also known as the "friends of the wild rivers." My favorite rivers are the Rio Fernando de Taos and the stream where I live, a small tributary of the Rio Fernando called Apache Creek.

Back in 2005 when I first joined Amigos Bravos, Rachel Conn helped me get a watershed map of the Rio Fernando headwaters that was done by the Forest Service. I was surprised to see that Apache Creek wasn't even shown as a perennial stream on that map.

Apache Creek is a perennial stream, or at least it used to be. For hundreds of years, probably, it ran from near Apache Pass down to the confluence with the Rio Fernando. But that two miles or so of stream wasn't listed by the Forest Service as part of the river miles that the Carson National Forest is responsible for. As far as they were concerned Apache Creek didn't even exist, at least not as a year-round water source.

That has been kind of a self-fulfilling misconception for the Forest Service, because during the last seven years most of Apache Creek has stopped running year-round, due to the accumulated impacts of the intensive riparian grazing that is scheduled every year by the Forest Service.

Apache Creek still runs year-round for about a half-mile, where it's located on private land. But the rest of the creek is located on the Carson Forest, and the loss of vegetation and shade and the siltation from federal riparian grazing there have pretty well stopped Apache Creek from running for a good part of the year. The Forest Service didn't officially recognize Apache Creek and because of that, the overgrazing they are permitting is gradually making Apache Creek disappear. And unfortunately, the same impacts and the same water quality and quantity losses are occurring on the upper Rio Fernando.

The NMED Record of Decision says the Rio Fernando headwaters and Apache Creek are impaired by bacteria, and the cause is livestock grazing. But the Forest Service isn't making any changes because they still haven't admitted that Apache Creek and the Rio Fernando are impaired with E. coli. They just will not admit they are doing anything wrong.

Their only significant response has been to claim that that the upper Rio Fernando is not a perennial stream anymore, so the water qualily standards should be downgraded. The NMED went along with the Forest Service and did that. But then the EPA stepped in and overruled the NMED, and they reinstated the perennial standard on the Rio Fernando.

This meeting is for the purpose of getting our comments on what needs to be done to restore and protect the upper Rio Grande. Here's my suggestion: I think the NMED needs to stop going along with the Forest Service, and start taking a strong stand against some specific parts of Forest Service policy.

First, the environmental assessments on Forest Service land should not be done by Forest

Service personnel, because they are biased. Basically, the Forest Service has been covering their own butts and trying to justify their own job performance. That is why they still haven't admitted that the upper Rio Fernando has a bacteria problem from overgrazing. So I believe environmental assessments on National Forest land should be done by the U.S. Fish and Wildlife Service or the EPA — not by the Forest Service. I think the NMED should support that change.

The second Forest Service policy that should be changed is their longstanding guideline that riparian zones should be grazed down to "4-inch stubble." It's no wonder that a lot of rivers on federal land are polluted with E. coli and choked with siltation. Because the grazing permittees are being instructed to strip the wetlands almost down to the ground, year after year. In the process, streambanks are being broken down and tons of manure are being deposited in or near the rivers all summer long.

We don't need 4-inch stubble on wetlands and streams. We need tall vegetation along the rivers, and if we get healthy amounts of vegetation and shrubs, cold, clean water will start running again on our headwaters.

The third problem with Forest Service management is their lackadaisical oversight and enforcement for livestock grazing. They should start requiring radio tags on the cattle, and daily monitoring of the herds to stop the cattle from spending all their time in and around the streams.

The Forest Service and the grazing permittees need to start proving that they are reducing the impacts of federal grazing. But so far, they are still refusing to admit that there are significant environmental impacts from current practices.

I'm not exaggerating. I have lived with these problems for many years. I have come to the Conclusion that it's time to mobilize public opinion and the NMED to force the Forest Service and the BLM to make the changes that are needed to protect Western water sources, before it's too late.

Jerry Yeargin
Jerry Yeargin
HC 71 Box 101
Taos, NM 87571

(Please cc. to Lynette Guevarva and Abe Franklin)

NMED Response: *Thank you for your comments and your attendance at the public meeting in Taos on June 28. As you noted, rangeland grazing is currently listed as a probable source for Rio Fernando de Taos (Tienditas Creek to headwaters) on the 2012-2014 Integrated List. Following the SWQB process for identifying and documenting probable sources* *http://www.nmenv.state.nm.us/swqb/PS/*-

> *"Any new impairment listing will be assigned a Probable Source of "Source Unknown." Probable Source Sheets will continue to be filled out during rotational watershed surveys and watershed restoration activities by SWQB staff. Information gathered from the Probable Source Sheets will be used to generate a draft Probable Source list in consequent TMDL planning documents. These draft Probable Source lists will be finalized with watershed group/stakeholder input during the pre-survey public meeting, TMDL public meeting, WBP development, and various public comment periods. The final Probable Source list in the approved TMDL will be used to update the subsequent Integrated List."*

Rangeland grazing is included as a Probable Source for both assessment units in the Upper Rio Grande TMDLs. Rangeland grazing will be added to the list of probable sources for Apache Canyon (Rio Fernando de Taos to headwaters) per our current probable source standard operating procedure that was further explained to you in a letter dated XXX (and is also available at: ftp://ftp.nmenv.state.nm.us/www/swqb/MAS/SOP/4.1SOP-ProbableSourcesDetermination2011.pdf), and it will remain for Rio Fernando de Taos (Tienditas Creek to headwaters), on the upcoming 2014-2016 Integrated List.

SWQB recognizes your concern about USFS land management in the Rio Fernando de Taos watershed. SWQB believes TMDLs to be important watershed planning tools that should be utilized by other agencies and stakeholder watershed groups. As noted in the TMDL and Appendix C, USFS data was utilized in the assessment process for Rio Fernando de Taos and Apache Canyon.

Lynnette Guevara
Assessment Coordinator
NMED-SWQB
1190 St. Francis Dr. P.O. Box 5469
Santa Fe, NM 87502-5469

RECEIVED
JUL 03 2012
SURFACE WATER
QUALITY BUREAU

Re: Additional comments on upper Rio Grande TMDLs.

Dear Ms. Guevara,

July 2, 2012

1.) In the Integrated List, Apache Canyon (Rio Fernando to headwaters), AU ID NM-98A_002, P. 93, and Rio Fernando de Taos (USFS bnd at canyon to Tienditas Creek) AU ID NM-2120 A_513, P. 147, are both assessed as impaired with E. coli with the only probable source listed as "source unknown."

2.) I feel these probable source listings are incomplete and inaccurate. The nearby stretch of the Rio Fernando (Tienditas Creek to headwaters), AU ID NM 98-A_001, P. 146, is located partly on the same Forest Service grazing allotment as the Apache Canyon AU and is shown as impaired with E. coli, with rangeland grazing as a probable source. The Rio Fernando de Taos (R Pueblo d Taos to USFS bnd at canyon) AU ID NM-2120 A_512, P. 145, is also listed as impaired with E. coli and rangeland grazing is given as a probable source.

3.) Assessment Units NM 98 A_002 and NM-2120 A_513 are located upstream of, respectively, NM-98 A_001 and NM-2120 A_512 which, as noted, have rangeland grazing listed as a probable source of E. coli impairment. Since the predominant locus of rangeland grazing on the Rio Fernando is located on the Flechado grazing allotment at the upper end of the Rio

Fernando, it is logically consistent to also list the assessment units referenced in paragraph 1.) above as having rangeland grazing as a probable source of the bacteria impairment.

4.) Furthermore, as noted in my comments for the draft Integrated List which were included in the ROD, there is abundant evidence of grazing impacts already documented in three on-site survey reports which have been done in recent years by the SWQB.

5.) As instructed by the SWQB, I have waited to submit these particular comments during the TMDL comment period. Accordingly, please insure that the assessments units referenced in paragraph 1.) above are updated in the 2012 Integrated List to show rangeland grazing as a probable impairment source. These revisions are overdue and justified. They are needed to limit further bacterial impacts on the Rio Fernando resulting from overgrazing on Forest Service land. So these changes should not and must not be deferred until 2014, which you mentioned to me on June 28 is a possibility.

Thank you for all your help so far.

Sincerely,

Jerry Yeargin

Jerry Yeargin
HC 71 Box 101
Taos, NM, 87571

NEW MEXICO
ENVIRONMENT DEPARTMENT

Resource Protection Division

Harold Runnels Building
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SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

DAVE MARTIN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary
JAMES H. DAVIS, Ph.D.
Division Director

July 11, 2012

Jerry Yeargin
HC71 Box 101
Taos, NM 87571

Mr. Yeargin –

It was good to meet you in person the other day at the URG TMDL meeting. I am writing in response to your July 2, 2012 letter.

The approach for identifying "Probable Sources of Impairment" on the Integrated List was modified during development of the 2010 – 2012 Integrated List as detailed on our web site at: http://www.nmenv.state.nm.us/swqb/PS/ (also attached). From the 2010 listing cycle forward, any new "Probable Cause of Impairment" are assigned a Probable Source of "Source Unknown" during development of Integrated List. Probable Sources noted on the most recent Site Condition/Probable Source sheets completed by SWQB staff and stakeholders are then used to generate draft Probable Source list in subsequent TMDL planning documents. These draft Probable Source lists are finalized with watershed group/stakeholder input during the draft TMDL meeting and public comment period. The final Probable Source list in the approved TMDL are used to update the subsequent draft Integrated List. This is why Apache Creek only includes "Source Unknown" on the 2012 Integrated List. The Rio Fernando de Taos (Tienditas Creek to headwaters) listing pre-dates this current approach to probable sources, which is why Rangeland Grazing is already noted as a probable source for this particular water on the Integrated List.

We appreciate your concern, and will be certain to include "Rangeland Grazing" as a probable source for Apache Canyon in both the TMDL document and on the draft 2014-2016 Integrated List. If you need any additional information, please contact me at 505-827-2904.

Sincerely,

Lynette Guevara
Assessment Coordinator

Comment Set C

United States Department of Agriculture | Forest Service | Southwestern Region 3
Carson National Forest | 208 Cruz Alta Road
Taos, New Mexico 87571
(575) 758-6200
FAX (575) 758-6213
V/TTY (575) 758-6329

File Code: 2520
Date: July 5, 2012

Heidi Henderson
Assessment and TMDL Team Leader
NM Environment Dept., Surface Water Quality Bureau
1190 St. Francis Dr.
Santa Fe, NM 87502

Dear Ms. Henderson:

The Carson National Forest has reviewed the E. coli TMDLs for waters that occur on the Forest and provide the following comments:

1) Table 3.1 (page 23) identifies the associated criterion as the single sample criterion, yet the TMDL is based on the geometric mean (Table 3.3, page 27). We realize that the geometric mean provides a more conservative target load. We suggest that both values are presented in Table 3.1 for clarification.

2) Table 3.3 (page 27) summarizes the target load. Our calculations are somewhat different that those presented in Table 3.3 for the following AUs:

Assessment Unit	Target Load (Table 3.3)*	FS Calculation
Apache Canyon	8.41	9.55
Rio Fernando de Taos (Tienditas to headwaters)	4.92	4.78
Rio Fernando de Taos (Rio Pueblo to USFS)	2.12	2.10
Rio Fernando de Taos (USFS to Tienditas)	2.46	2.48
Rio Pueblo de Taos	6.99	6.97

*times 10x (as presented in table 3.3)

We request that you recheck the calculations.

3) Comparing Tables 3.3 and 3.4, for the Rio Fernando de Taos (USFS to Tienditas Creek) the measured load, based on the arithmetic mean (109) is lower than the standard (126). Based on the discussion at the public meeting in Taos, we understand that the listing is based on the exceedence ratio (Table 3.1). We request that you clarify this in the final TMDL.

4) Table 3.6 Magnitude column is in units of lbs/day. Should this be in cfu/day?

5) Also discussed at the public meeting was the addition of a table that summarizes the load reduction in percent. We suggest that inclusion of the percent load reduction required to meet the TMDL would be helpful for stakeholders who may institute monitoring programs to measure the success of their BMPs.

As always, we appreciate your efforts to monitor water quality and keep us informed of the results. We look forward to participating during development and implementation of the Watershed Based Plans for these waters.

Sincerely,

/s/ Diana M. Trujillo
DIANA M. TRUJILLO
Acting Forest Supervisor

cc: Tammy Malone
Chris W Furr
Gregory J Miller
Roy Jemison

NMED Response: *Thank you for your comments. The comments will be addressed in the same format as they were submitted.*

1. *You correctly note that Table 3.1 displays the single sample E.coli criterion and Table 3.3 uses the geometric mean E.coli criterion in the Target Load calculations. The geometric mean E.coli criterion has been added as a footnote to Table 3.1.*

2. *Thank you for reviewing the calculations. SWQB compared your results to the Target Loads in Table 3.3. The marginal difference in the values is a result of rounding and the use of two significant figures in Table 3.3. No change was made to the Target Loads in Table 3.3 based on this comment.*

3. *A footnote was added to Table 3.4 to explain why values in the "arithmetic mean" column may be lower than the WQS in Table 3.3.*

4. *The correction has been made in Table 3.6.*

5. *SWQB may include percent reduction calculations in TMDLs, however, public comment on recent TMDLs has caused SWQB to reevaluate this approach for E.coli TMDLs. SWQB recognizes that for this TMDL, calculating a percent reduction is particularly challenging. This is largely because the samples collected and the impairment determinations are based on exceedences of the State's single sample criterion and the TMDL is written to the address the monthly geometric mean standard. As such, any simple comparison of these numbers is fraught with challenge and, in this case, will result in an over estimation of the actual reduction necessary to achieve the TMDL goals.*

   Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the "percent reduction" value is can be calculated in multiple ways and as a result can often be misinterpreted. This is clearly the case in this situation. For these reasons, SWQB will continue to not include load reduction estimations in E.coli TMDLs.

Comment Set D

Public Comments on TMDLs for E.coli in Apache Canyon (Rio Fernando de Taos to headwaters) and the Rio Fernando de Taos (Tienditas Creek to headwaters)

The 2012-2014 ROD indicates that SWQB staff used the department's hydrology protocol to determine that these waters were perennial. We believe there are serious problems with this protocol, the manner in which it is being applied and interpreted, and submitted an inspection of public records act (IPRA) request to obtain the original field sheets and other supporting data used in making these determinations.

We find serious flaws and omissions in the application of the SWQB hydrology protocol to Apache Canyon and the Rio Fernando de Taos by SWQB staff. These mistakes lead to the incorrect conclusion that these waters were perennial and this error is carried over into the calculations used in the draft version of the E. coli TMDLs for these waters.

The level 1 hydrology determination field sheet filled out by S. Lemon and L. Guevara on 5-23-11 for the Rio Fernando de Taos at 28RFerna031.7 indicates that the hydrology protocol was conducted at a lat/long of 36.41523/105.33622. These coordinates do not appear to be on the Rio Fernando de Taos, nor in it's watershed.

The level 1 hydrology determination field sheet for this site also contains a score of 2.25 for particle size or stream substrate sorting. There is no possible way to arrive at this score if the hydrology protocol is correctly followed. The only values allowed are 0, 1.5 and 3. The hydrology protocol gives several options for collecting pebble count data and a pebble count tally sheet appears on the Level 1 field measurements form included in the hydrology protocol. This form was provided in response to our IPRA but was blank. Our IPRA specifically requested "... all pebble count data including in-channel and out-of-channel counts and percentage compositions for silt/clay, sand, gravel, cobble, boulders and bedrock, collected from each site." The hydrology protocol provides no option for estimating pebble count data. This leads us to conclude a pebble count was not performed at this site and the score of 2.25 that appears on the level 1 hydrology determination field sheet for particle size or stream substrate sorting was arrived at by some means other than those allowed by the hydrology protocol.

Our IPRA request also specifically asked for "... all measurements and calculations used to determine max depth, bankfull stage, flood prone area location, flood prone area width, bankfull width and floodplain to active channel ratio. " There was no response to this request either. The hydrology protocol gives instruction on how these measurement are to be obtained but no option for estimating them. This leads us to conclude that the scores for sinuosity and flood plain and channel dimensions that appear on the level 1 hydrology determination field sheet for particle size or stream substrate sorting were also obtained by a method not allowed by the hydrology protocol.

The level 1 hydrology determination field sheet filled out by S. Lemon and L. Guevara on 5-23-11 for the Rio Fernando de Taos blw Elk exclosure contains similar flaws. A score of 2.5 is recorded for differences in vegetation. The hydrology protocol allows only values of 0, 1, 2 or 3 for this parameter.

Sinuosity at this site was scored at 3, but no data were provided in response to the IPRA request that support this score, again leading to the conclusion that it was arrived at through methodology that is not included in the hydrology protocol.

Floodplain and channel dimensions were scored at 0.5. The only scores allowed by the hydrology protocol for this parameter are 0, 1.5 and 3. Again, no data were provided in response to the IPRA request to support this score, leading to the conclusion that it was determined by means outside of those allowed by the hydrology protocol.

The level 1 hydrology determination field sheet filled out by S. Lemon and L. Guevara on 5-23-11 for Apache Canyon (no site ID) contains a score of 0.5 for floodplain and channel dimensions when only values of 0, 1.5 and 3 are allowed by the hydrology protocol, and, as with the previous two sites, no data were provided in response to the IPRA request that supports this score.

Similarly, the score of 1 recorded for sinuosity is not supported by any data.

Finally, the sum of scores that are recorded on the first page is 13, not 13.5. In turn, this changes the final score at the bottom of page 2 to 19 and the determination, according to the guidance in the hydrology protocol for overall score interpretation, should have been intermittent.

Because we were skeptical of the hydro protocol results presented in the 2012-2014 ROD for these sites due to our familiarity with this area, Don Carlson and Doug Eib performed the hydrology protocol at these sites on Sunday, June 24, 2012. Our level 1 hydrology determination field sheets and level 1 field measurements, together with the level 1 hydrology determination filled in by S. Lemon and L. Guevara are included with these comments to allow the reader to compare our scores with those recorded the previous year.

Apache Canyon (Rio Fernando de Taos to headwaters), and the

Rio Fernando de Taos (28RFerna031.7) both scored strongly ephemeral. The Rio Fernando de Taos blw Elk exclosure site scored in the middle of the intermittent range. It should be noted that the SPI index was wetter in 2012 than it was in 2011 when the SWQB data was collected.

It should also be noted that there is no provision in the hydrology protocol for applying the result to only an assessment unit or a stream or river reach. The hydro protocol clearly states that it provides a methodology for distinguishing among ephemeral, intermittent and perennial streams and rivers in New Mexico. Therefore, the Rio Fernando de Taos cannot be deemed perennial below Tienditas and ephemeral or intermittent above Tienditas through use of the the hydrology protocol.

Unless SWQB can provide data to justify their scores, or provide new data and scores, we request that the only available data be used to correct the Integrated List at the earliest opportunity and that the E. coli TMDLs for Apache Canyon and the Rio Fernando de Taos be revised to reflect their status as determined by proper application and interpretation of the SWQB hydrology protocol.

Respectfully,

Dr. M. Lyndsay Remerowski
Dr. Douglas Eib
Donald Carlson

UDF 3 Station KFDT001

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

elev: 2729m

Date: 5-23-11	**Stream Name:** Rio Fernando de Taos	**Latitude:** 36.41523
Evaluator(s): Lemon, Guevara	**Site ID:** 28RFerna031.7	**Longitude:** 105.33622
TOTAL POINTS: *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** Tienditas Crk to hw	**Drought Index (12-mo. SPI Value):**

WEATHER CONDITIONS	**NOW:**	**PAST 48 HOURS:**	**Has there been a heavy rain in the last 48 hours?**
	___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) 15 %cloud cover X clear/sunny	___ storm (heavy rain) ___ rain (steady rain) X showers (intermittent) ___ %cloud cover ___ clear/sunny possible	___ YES X NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** X YES ___ NO **Diversions** ___ YES X NO **Discharges** ___ YES X NO Culvert @ Hwy 64 **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish check for fish data	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
Some upland veg. on banks			**SUBTOTAL (#1.1 – #1.6)**	17

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.		**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.
	3	1.5		0
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	24.5
If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL. If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL. YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.				
1.10. Particle Size or Stream Substrate Sorting Grassy Meadow so hard to distinguish	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).		Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3 2.25	1.5		0
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are <u>not</u> found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	27.25

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		

We know there is a spring u/s but did not actually see it

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6-24-12	Stream Name: Rio Fernando de Taos	Latitude: 36.4184
Evaluator(s): D. Carlson, D. Eib	Site ID: Abv. Hwy 64	Longitude: 105.343
TOTAL POINTS: 8 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** Tienditas Ck. to H.W.	**Drought Index (12-mo. SPI Value):** 0-1

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) 15 %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover X clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES X NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES X NO **Diversions** ___ YES X NO **Discharges** ___ YES X NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	3

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

HYDROLOGY DETERMINATION
FIELD SHEETS

Available at the SWQB Hydrology Protocol website:
(http://www.nmenv.state.nm.us/swqb/Hydrology/index.html)

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
				SUBTOTAL (#1.1 – #1.9) 8
If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL. If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL. YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.				
1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.	
	3	1.5	0	
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are <u>not</u> found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
				TOTAL POINTS (#1.1 – #1.12) 8

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	8

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes

NOTES:

LEVEL 1 Field Measurements

Pebble Count Tally Sheet

Site Name: Rio Fernando de Taos abv Hwy 64 **Storet ID:** ______

Date: 6-24-12 **Crew:** D. Eib, D. Carlson

Substrate Type	Diameter Range	In-Channel COUNT	In-Channel % Composition	Out of Channel COUNT	Out of Channel % Composition
Silt/Clay	< 0.06 mm	卌 卌 卌 卌	40%	卌 卌 |	22
Sand	0.06 – 2.0 mm (gritty)	卌 卌 卌 ||||	38	卌 卌 卌 卌	40
Gravel	2.0 – 64 mm	卌 卌	20	卌 卌 卌	30
Cobble	64 – 256	|	2	||||	8
Boulder	> 256 mm				
Bedrock	---				

****Please be sure to measure at least 50 pebbles (10 in 5 transects or 5 in 10 transects- depending on stream size) for accurate distributional representation****

INDICATOR #1.8 (*Floodplain and Channel Dimensions*) – MEASUREMENTS & CALCULATIONS**							
Max Depth (#1)	**Bankfull Stage (#2)**	**Maximum Depth Value (#3)**	**2x Maximum Depth Value (#3)**	**Flood-Prone Area Location (#4)**	**Flood-Prone Area Width (#5)**	**Bankfull Width (#6)**	**Floodplain to Active Channel Ratio** (FPA Width / Bankfull Width)
	0.45m	0.45m	0.9m		27.4m	1.1m	24.6

****REFER to Figure 3 on page 19 for clarification**

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
1	Doug in dry channel. U.S.	Above Hwy 64 looking U.S.
2	Doug in dry channel U.S.	" "

NOTES:

Sinuosity measurements:

measured stream distance = 51 m $\quad$ 51m/42m = 1.2

straight line distance = 42 m

measured on the ground with tape.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6-24-12	**Stream Name:** Rio Fernando de Taos	**Latitude:** 36.41842
Evaluator(s): D. Eib, D. Carlson	**Site ID:** blw elk exclosure	**Longitude:** 105.34344
TOTAL POINTS: 14.5 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** (Rio Fernando de Taos) Tienditas Ck. to Headwaters	**Drought Index (12-mo. SPI Value):** 0-1

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover X clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover X clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES X NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES X NO **Diversions** ___ YES X NO **Discharges** ___ YES X NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	5

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.		**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.
	3	1.5		0
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
SUBTOTAL (#1.1 – #1.9)				11
If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL. If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL. YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.				
1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).		Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5		0
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are <u>not</u> found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
TOTAL POINTS (#1.1 – #1.12)				13

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		14.5

LEVEL 1 Field Measurements

Pebble Count Tally Sheet

Site Name: Rio Fernando de Taos blw elk exclosure **Storet ID:**
Date: 6-24-12 **Crew:** D. Carlson, D. Erb

Substrate Type	Diameter Range	In-Channel COUNT	In-Channel % Composition	Out of Channel COUNT	Out of Channel % Composition
Silt/Clay	< 0.06 mm	卌 卌 卌 ////	38%	卌 卌 卌 卌 //	44%
Sand	0.06 – 2.0 mm (gritty)	卌 ///	16%	/	2%
Gravel	2.0 – 64 mm	卌 卌 //	24%	卌 卌 卌 卌 ////	48%
Cobble	64 – 256	卌 卌 /	22%	///	6%
Boulder	> 256 mm				
Bedrock	---				

****Please be sure to measure at least 50 pebbles (10 in 5 transects or 5 in 10 transects-depending on stream size) for accurate distributional representation****

INDICATOR #1.8 (*Floodplain and Channel Dimensions*) – MEASUREMENTS & CALCULATIONS**							
Max Depth (#1)	**Bankfull Stage (#2)**	**Maximum Depth Value (#3)**	**2x Maximum Depth Value (#3)**	**Flood-Prone Area Location (#4)**	**Flood-Prone Area Width (#5)**	**Bankfull Width (#6)**	**Floodplain to Active Channel Ratio** (FPA Width / Bankfull Width)
	0.4m	0.4m	0.8m		14.8m	1.4m	10.6

****REFER to Figure 3 on page 19 for clarification**

NMED Surface Water Quality Bureau –
LEVEL 2 Hydrology Determination Field Sheet
Borderline Cases

Date:	**Stream Name:**	**Latitude:**
Evaluator(s):	**Site ID:**	**Longitude:**
LEVEL 1 Total Points:	**Reach Description:**	**Drought Index (12-mo. SPI Value):**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover ___ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ **YES** ___ **NO** **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ **YES** ___ **NO** **Diversions** ___ **YES** ___ **NO** **Discharges** ___ **YES** ___ **NO** **Explain in further detail in NOTES section

CHECK the appropriate rating for each indicator.

LEVEL 2 INDICATORS	**Stream Condition**			
	Strong	**Moderate**	**Weak**	**Poor**
2.1. Water in Channel (OPTIONAL)				
2.2. Hyporheic Zone/Groundwater Table				
2.3. Bivalves	**Present =** ___		**Absent =** ___	
2.4. Amphibians	**Present =** ___		**Absent =** ___	
2.5. Macroinvertebrates (abundance/diversity)**				
2.6. EPT Taxa**	**Present =** ___		**Absent =** ___	
2.7. Fish				

** Macroinvertebrates and EPT Taxa should not be rated until identification and enumeration has been performed in a laboratory setting by a qualified aquatic biologist/environmental scientist.

Photo #	**Description** (US, DS, LB, RB)	**Notes**

NOTES: (use back-side of this form for additional notes)

___

___

___

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
1	RFdT D.S. at road crossing	Dry
2	Doug standing in dry channel R.B.	Appx. 50' below road crossing
3	RFDT Dry Channel w/ Doug	Taken below confluence with Apache Canyon

NOTES:

Sinuosity Measurements

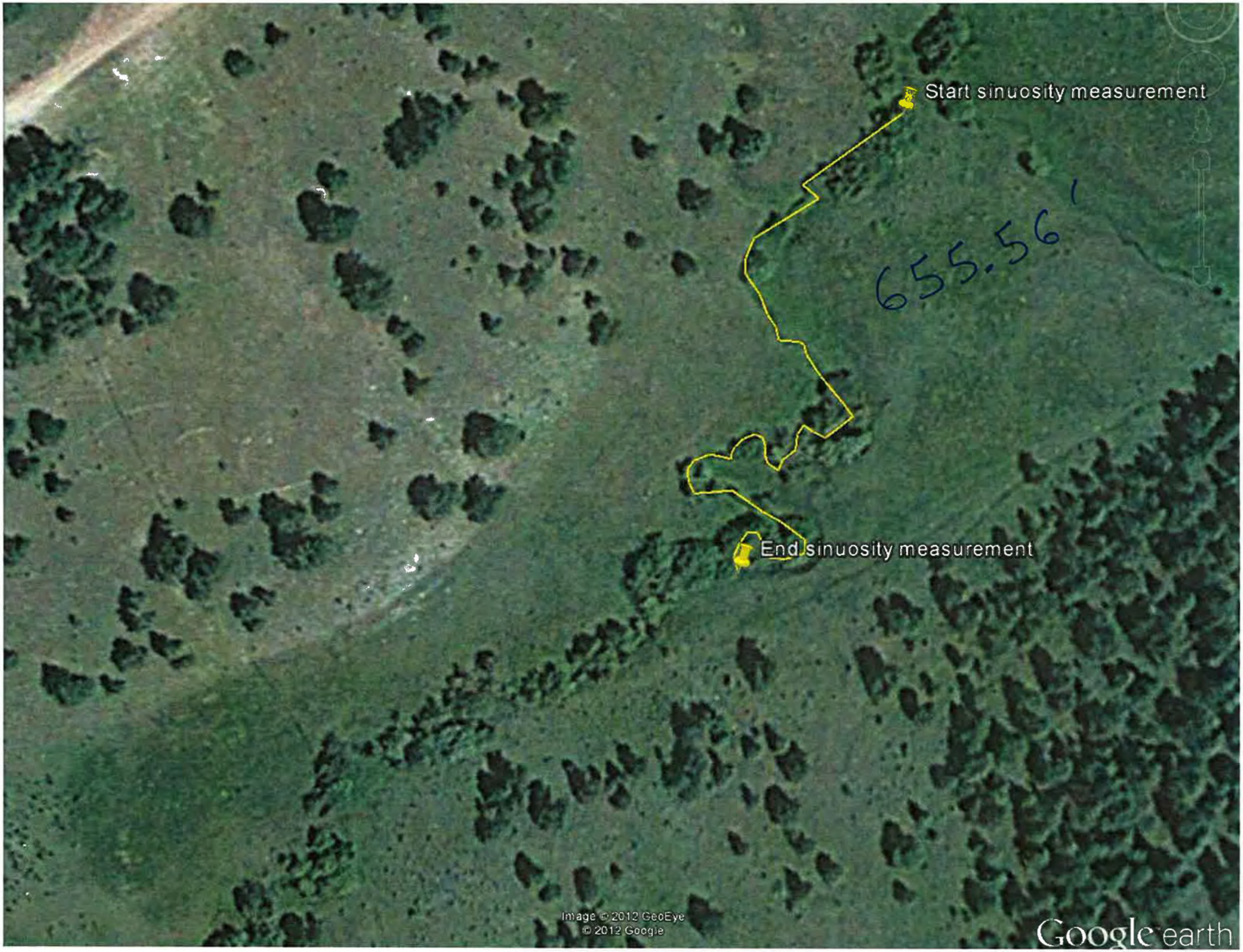
measured stream distance = 655.56 feet

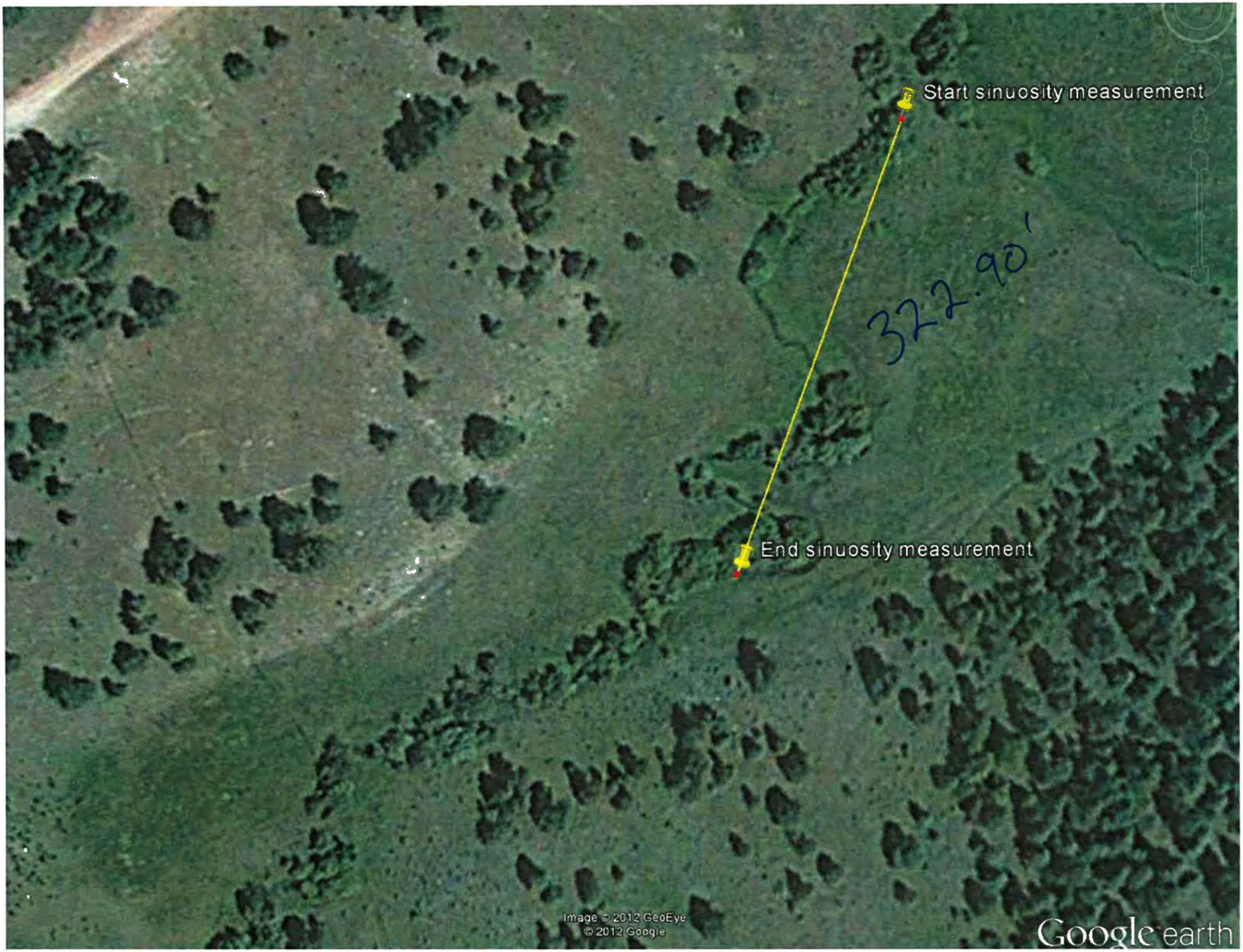
straight line distance = 322.90 feet

$655.56' / 322.90' = 2.03$

measurements made using Google Earth

aerial imagery dated 9/4/2010


Start sinuosity measurement
655.56'
End sinuosity measurement
Image © 2012 GeoEye
© 2012 Google
Google earth


Start sinuosity measurement
322.90'
End sinuosity measurement
Image © 2012 GeoEye
© 2012 Google
Google earth

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

elev = 2638m

Date: 5-23-11	**Stream Name:** Apache Canyon	**Latitude:** 36.39230
Evaluator(s): Slemen, Guevara	**Site ID:** ~~AP02 (USFS)~~ NOSWQB SITE ID	**Longitude:** 105.35109
TOTAL POINTS: *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** RF d Taos to hw	**Drought Index (12-mo. SPI Value):**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) <5 %cloud cover X clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) X showers (intermittent) ___ %cloud cover X clear/sunny possible?	**Has there been a heavy rain in the last 48 hours?** ___ YES X NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES X NO **Diversions** ___ YES X NO **Discharges** ___ YES X NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel * Have documentation that channel goes dry	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed in grassy meadow grasses	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	13.5

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	**2**	**1**	**0**
1.8. Floodplain and Channel Dimensions See notes	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.		**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.
	3	**1.5**	0.5	**0** See notes
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles. mostly run/riffle - no real pools	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	16.0

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	**1.5**	**0**
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.
	Present = 3		**Absent = 0**

1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	**1**	**0.5**	**0**
			TOTAL POINTS (#1.1 – #1.12)	18.0

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	19.5

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6-24-12	**Stream Name:** Apache Canyon	**Latitude:** 36 3923
Evaluator(s): D. Eib, D. Carlson	**Site ID:** Above Confluence	**Longitude:** 105.351
TOTAL POINTS: 8.5 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** Apache Canyon (Rio Fernando de Taos to H.W.)	**Drought Index (12-mo. SPI Value):** 0-1

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X_ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X_ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X_ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** ___ YES _X_ NO **Diversions** ___ YES _X_ NO **Discharges** ___ YES _X_ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	**STREAM CONDITION**			
	Strong	**Moderate**	**Weak**	**Poor**
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	2

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	**Moderate**	**Weak**	**Poor**
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	**2**	**1**	**0**
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.		**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.
	3	**1.5**		**0**
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
				SUBTOTAL (#1.1 – #1.9) 7

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

	Strong	Moderate	Weak	Poor
1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).		Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	**1.5**		**0**
1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are <u>not</u> found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	**1**	**0.5**	**0**
				TOTAL POINTS (#1.1 – #1.12) 7

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.**		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	8.5

LEVEL 1 Field Measurements

Pebble Count Tally Sheet

Site Name: Apache Canyon Above Confluence **Storet ID:**
Date: 6-24-12 **Crew:** D. Carlson, D. Eib

Substrate Type	Diameter Range	In-Channel COUNT	In-Channel % Composition	Out of Channel COUNT	Out of Channel % Composition
Silt/Clay	< 0.06 mm	卌 卌 卌 卌 卌 卌 卌 ll	74	卌 卌 卌 卌 卌 卌 卌 卌	80
Sand	0.06 – 2.0 mm (gritty)	卌 l	12	卌 l	12
Gravel	2.0 – 64 mm	卌 ll	14	llll	8
Cobble	64 – 256				
Boulder	> 256 mm				
Bedrock	---				

****Please be sure to measure at least 50 pebbles (10 in 5 transects or 5 in 10 transects-depending on stream size) for accurate distributional representation****

INDICATOR #1.8 (*Floodplain and Channel Dimensions*) – MEASUREMENTS & CALCULATIONS**							
Max Depth (#1)	**Bankfull Stage (#2)**	**Maximum Depth Value (#3)**	**2x Maximum Depth Value (#3)**	**Flood-Prone Area Location (#4)**	**Flood-Prone Area Width (#5)**	**Bankfull Width (#6)**	**Floodplain to Active Channel Ratio** (FPA Width / Bankfull Width)
		0.25m	0.5m		5.3m	0.45m	11.8

****REFER to Figure 3 on page 19 for clarification**

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes

NOTES:

Sinuosity measurements:

measured stream distance = 190

straight line distance = 145'   190/145 = 1.31

measured on the ground with tape.

NMED Response: *Thank you for your comments. The commenters question SWQB's determination of Rio Fernando de Taos (Tienditas Creek to headwaters) and Apache Canyon (Rio Fernando de Taos to headwaters) as perennial. They provide recent documentation, collected by them, which they believe indicates that these AUs should be classified as ephemeral.*

SWQB notes that these findings and conclusions were documented in the 2012-2014 State of New Mexico CWA §303(d)/§305(b) Integrated List & Report. This document underwent a 45-day public comment period ending on January 30, 2012, and was approved by the WQCC on March 13, 2012, and EPA on May 8, 2012. As such SWQB is unable to directly address these comments.

Regardless SWQB disagrees with the conclusion of this public comment set and stands by its determination of these waters as perennial stream segments. It is important to note that the final hydrology determinations for the Rio Fernando de Taos and Apache Canyon were based in part on SWQB's Hydrology Protocol survey, but supporting information was also considered to make the final hydrology determinations as provided for in the Hydrology Protocol (see pages 33-34 of the Hydrology Protocol, available at: ftp://ftp.nmenv.state.nm.us/www/swqb/MAS/Hydrology/HydrologyProtocolAPPROVED05-2011.pdf). This supporting information and summary information were also provided in our response to your IPRA request on this topic, and are also in the 2012-2014 State of New Mexico CWA §303(d)/§305(b) Integrated List & Report Record of Decision. Most significant is the documentation of the nearly continuous presence of water in the stream channel by both a local resident (last 20-years) and by SWQB and US Forest Service Professionals (over the last 5 years). This information is summarized below.

Rio Fernando de Taos (Tienditas Creek to headwaters)

The U.S. Forest Service (USFS – Carson National Forest) visited the Rio Fernando de Taos at the Highway 64 crossing 14 times from 2007 to 2010 and all site visits had stream flow. There was also surface flow during the three SWQB site visits in 2009. Documented flow observations at this site by the USFS and SWQB across various seasons and multiple years indicate continual flow at this station and support the perennial determination (Table 1; Photo 1). A stakeholder with twenty years of experience in this watershed observed that this upper reach of the Rio Fernando de Taos went dry during the summer 2011 drought (Jerry Yeargin, personal communication 08/04/11). SWQB adjusted the Hydrology Protocol (HP) indicator 1.1 score (Water in the Channel) from "Strong" to "Moderate" to reflect the variable flow status of this stream reach, nevertheless the final HP score was still well within the perennial range.

Table 1. Flow observations on Rio Fernando de Taos at the HWY 64 crossing (28RFerna031.7 = USFS RFDT01)

Source	*Source SITE ID*	*DATE*	*Flow*	*Flow unit*
USFS	*RFDT01*	*5/8/07*	*1.27*	*cfs*
USFS	*RFDT01*	*6/11/07*	*0.34*	*cfs*
USFS	*RFDT01*	*7/18/07*	*0.08*	*cfs*
USFS	*RFDT01*	*8/30/07*	*0.16*	*cfs*
USFS	*RFDT01*	*10/18/07*	*0.09*	*cfs*
USFS	*RFDT01*	*7/21/09*	*1.5*	*gpm*
USFS	*RFDT01*	*7/22/09*	*2.0*	*gpm*
USFS	*RFDT01*	*8/13/09*	*1.0*	*gpm*
USFS	*RFDT01*	*9/2/09*	*3*	*gpm*
USFS	*RFDT01*	*4/13/10*	*41*	*cfs*
USFS	*RFDT01*	*5/13/10*	*2.6*	*cfs*
USFS	*RFDT01*	*6/15/10*	*0.17*	*cfs*
USFS	*RFDT01*	*7/21/10*	*0.04*	*cfs*
USFS	*RFDT01*	*9/9/10*	*0.01*	*cfs*
SWQB	*28RFerna031.7*	*3/19/09*	*0.3*	*cfs*
SWQB	*28RFerna031.7*	*5/19/09*	*0.4*	*cfs*
SWQB	*28RFerna031.7*	*9/22/09*	*0.1*	*cfs*

Photo 2. Rio Fernando de Taos (looking downstream of Highway 64)

The USFS has two sampling stations on Rio Fernando de Taos on the downstream and upstream side of the SWQB sampling location below the elk exclosure (NMED09 and RFDT03, *respectively). Flow observations from the USFS Carson National Forest indicate there was no or very minimal flow at these sampling stations during summer months (Table 2); however out of the 23 flow observations from 2007 through 2010, the streambed was completely dry on only 2 occasions (9% of total observations), consistent with a perennial determination. SWQB did not measure flow at this site during the 2009 water quality survey therefore there are no flow data from SWQB.*

Table 2. Flow observations at USFS stations on Rio Fernando de Taos below the elk exclosure

Source	Source SITE ID	DATE	Flow	Flow unit
USFS	RFDT03	5/8/07	2.09	cfs
USFS	RFDT03	6/11/07	0.33	cfs
USFS	RFDT03	7/18/07	0.08	cfs
USFS	RFDT03	8/30/07	0.26	cfs
USFS	RFDT03	10/18/07	0.03	cfs
USFS	RFDT03	7/21/09	0	gpm
USFS	RFDT03	7/22/09	0	gpm
USFS	RFDT03	8/13/09	0	gpm
USFS	RFDT03	9/2/09	0	gpm
USFS	NMED09	7/21/09	0	gpm
USFS	NMED09	7/22/09	0.25	gpm
USFS	NMED09	8/13/09	0	gpm
USFS	NMED09	9/2/09	0	gpm
USFS	RFDT03	04/13/10	4.71	cfs
USFS	RFDT03	05/13/10	3.8	cfs
USFS	RFDT03	06/15/10	0.16	cfs
USFS	RFDT03	07/21/10	dry	--
USFS	RFDT03	09/09/10	dry	--
USFS	NMED09	04/13/10	5.41	cfs
USFS	NMED09	05/13/10	5.6	cfs
USFS	NMED09	06/15/10	0.15	cfs
USFS	NMED09	07/21/10	0.01	cfs
USFS	NMED09	09/09/10	0.0012	cfs

Apache Canyon (Rio Fernando de Taos to headwaters)

The USFS has two sampling stations on Apache Canyon that bracket a private section (AP01 and AP02, respectively). USFS Carson National Forest E. coli monitoring report summaries indicate that during certain times of the year there is no flow at the mouth of Apache Canyon. The USFS visited Apache Canyon 19 times from 2007 to 2010 and all site visits had stream flow (Table 3). A stakeholder with twenty years of experience in this watershed also has observed that Apache Canyon does not go dry and did not go dry during the summer 2011 drought (Jerry Yeargen, personal communication 08/04/11). Documented flow measurements and observations in Apache Canyon across various seasons and multiple years indicate perennial flow supporting the final hydrology determination by the SWQB (Photo 2).

Table 3. Flow observations at USFS Apache Canyon stations

Source	Source SITE ID	DATE	Flow	Flow unit
USFS	*APC01*	*5/8/07*	*0.64*	*cfs*
USFS	*APC01*	*6/11/07*	*0.03*	*cfs*
USFS	*APC01*	*7/18/07*	*0.004*	*cfs*
USFS	*APC01*	*8/30/07*	*0.006*	*cfs*
USFS	*APC01*	*10/18/07*	*0.003*	*cfs*
USFS	*APC02*	*5/8/07*	*1.66*	*cfs*
USFS	*APC02*	*6/11/07*	*0.18*	*cfs*
USFS	*APC02*	*7/18/07*	*0.02*	*cfs*
USFS	*APC02*	*8/30/07*	*0.02*	*cfs*
USFS	*APC02*	*10/18/07*	*0.02*	*cfs*
USFS	*APC01*	*7/21/09*	*0.75*	*gpm*
USFS	*APC02*	*7/22/09*	*3.5*	*gpm*
USFS	*APC02*	*8/13/09*	*1*	*gpm*
USFS	*APC02*	*9/2/09*	*2*	*gpm*
USFS	*APC02*	*04/13/10*	*1.31*	*cfs*
USFS	*APC02*	*05/13/10*	*1.5*	*cfs*
USFS	*APC02*	*06/15/10*	*0.02*	*cfs*
USFS	*APC02*	*07/21/10*	*0.012*	*cfs*
USFS	*APC02*	*09/09/10*	*0.012*	*cfs*

Photo 2. Apache Canyon (riparian vegetation on Rio Fernando de Taos below the elk exclosure in background)

Comment Set E

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JUL 13 2012 9:55 AM
SURFACE WATER QUALITY BUREAU

Surface Water Quality Bureau
NEW MEXICO ENVIRONMENT DEPARTMENT

Public Comment Card

Meeting Date: June 28, 12

Comments Regarding: Rio Pueblo, Rio Don Fernando Taos

*OPTIONAL INFORMATION :

*Name: Jeanne Green *Affiliation: water sentinel, Sierra Club

*E-Mail: innerlight52@hotmail.com

*Mailing Address: 11 B Los Padillas Rd, El Prado NM 87529

Comments must be submitted in writing in order to be included in the public record. Please provide comments in the space below (use back if necessary):

The e-coli and other problems such as conductivity disolved Oxygen and temperature are serious issues with our rivers. In Oregon. The state pays farmers/ranchers to divert water to a cattle tank and fence off the riparian areas. If NM has such a program, there needs to be a concerted effort to contact ranchers and offer them assistance. It is not okay that a few persons in for-profit enterprises are allowed to pollute the streams to the detriment of all citizens downstream. This problem needs to be addressed with urgency

Turn comment card in tonight or mail / fax:

TMDL Coordinator 5469
Surface Water Quality Bureau, P. O. Box ~~26110~~ Santa Fe, NM 87502
Phone: (505) 827-0187; Fax: (505) 827-0160

Help Us Identify Probable Sources of Impairment

Name:	Jeanne Green
Phone Number (optional):	575 751-4130
Email or Mailing Address (optional):	innerlight52@hotmail.com
Date:	7-12-12

RECEIVED
JUL 13 2012
SURFACE WATER QUALITY BUREAU

Waterbody Name/ Watershed Name/ Location of concern:
Rio Pueblo Rio Don Fernando Taos NM

From the list below, please check the items you believe are sources of water quality impairment in the watershed or waterbody of concern. In the spaces next to each item you check, please use the following scale to indicate how much of a concern that item is to you by specifying a number between 1 and 3.

(1 - Slight Concern) (2 – Moderate Concern) (3 – High Concern)

✓	ACTIVITY	Scale of Concern		
☐	Feedlots	1	2	3
☐	Livestock Grazing	1	2	3
☐	Agriculture	1	2	3
☐	Flow Alterations (water withdrawal)	1	2	3
☐	Stream/River Modification(s)	1	2	3
☐	Storm Water Runoff	1	2	3
☐	Flooding	1	2	3
☐	Landfill(s)	1	2	3
☐	Industry/Wastewater Treatment Plant	1	2	3
☐	Inappropriate Waste Disposal	1	2	3
☐	Improperly maintained Septic Systems	1	2	3
☐	Other: *(please describe)*	1	2	3

✓	ACTIVITY	Scale of Concern		
☐	Pavement and Other Impervious Surfaces	1	2	3
☐	Roads/Bridges/Culverts	1	2	3
☐	Habitat Modification(s)	1	2	3
☐	Mining/Resource Extraction	1	2	3
☐	Logging/Forestry Operations	1	2	3
☐	Housing or Land Development	1	2	3
☐	Exotic Species	1	2	3
☐	Waterfowl	1	2	3
☐	Wildlife and domesticated animals other than waterfowl	1	2	3
☐	Recreational Use	1	2	3
☐	Natural Disturbances *(please describe)*	1	2	3
☐	Other: *(please describe)*	1	2	3

Comments: Cattle grazing upstream and old septic tanks are my highest concern. E. Coli is a high concern.

NMED Response: *Thank you for your comments and your attendance at the public meeting in Taos on June 28. SWQB shares your concerns about the water quality impairments in the Upper Rio Grande watershed. You note that the State of Oregon has a program in place to pay landowners to move their livestock away from waterbodies, however New Mexico does not have a similar program. Non-point sources are addressed through voluntary actions in New Mexico. The Watershed Protection Section (WPS) of the SWQB has staff available to assist local stakeholders in addressing non-point sources and is responsible for organizing all federal Clean Water Act §319(h) related activities in watersheds with TMDLs and impaired waters. As noted on the SWQB website* [*http://www.nmenv.state.nm.us/swqb/wps/*](http://www.nmenv.state.nm.us/swqb/wps/)*-*

> *"WPS staff cooperatively work to educate others and implement best management practices (BMPs) to reduce nonpoint source (NPS) pollutants from entering the surface and ground water resources of New Mexico. Workplans developed and funded under CWA §319(h) comprise a variety of efforts, including watershed association development, riparian area restoration, spill response, and treatment of abandoned mines."*

SWQB believes the TMDL document is a critical tool to be used by both the regulated community and stakeholders to improve water quality. To date, SWQB has worked with stakeholders in the Upper Rio Grande watershed to develop Watershed Based Plans, including on the Rio Pueblo de Taos and the Rio Santa Barbara. SWQB encourages you to work with WPS to incorporate your concerns into the ongoing watershed planning activities. Abe Franklin, Program Manager of WPS, can be contacted at (505) 827-2793.

Additionally, thank you for the submission of probable sources for Rio Fernando de Taos and Rio Pueblo de Taos. The tables in the Executive Summary and Table 3.6 have been updated to include your submission.